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Serious Delinquency and Gang Participation: Combining and Specializing in Drug Selling, Theft and Violence

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Abstract

Using Pittsburgh Youth Study data, we examined the extent to which over 600 gang members and non-gang involved young men specialized in drug selling, serious theft, or serious violence or engaged simultaneously in these serious delinquent behaviors, throughout the 1990s. We found that the increase in delinquency associated with gang membership was concentrated in two combinations: serious violence and drug selling; serious violence, drug selling, and serious theft. Several covariates were similarly associated with multi-type serious delinquency and gang membership (age, historical time, Black race, and residential mobility), suggesting that these behaviors may share common developmental, familial, and contextual risks. We encourage future research to further examine the association of gang membership with engagement in particular configurations of serious delinquency.

Gangs are a major social problem in the United States. On the 2010 National Youth Gang Survey, one-third of all surveyed law enforcement agencies reported a gang problem; the level was highest in large cities, where 86% reported a problem (National Gang Center, 2012). On the national School Survey on Crime and Safety (2007–2008 school year), one-in-five school principals reported problems with gangs, with reports higher from principals located in cities (34%) than those located in rural areas, towns, or suburbs (11–19%) and in high schools (43%), compared to elementary or middle schools (10–35%; Dinkes, Kemp, &

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Baum, 2009). Despite considerable study, several gaps remain in the gang literature. One important topic in need of more research is the extent to which gang membership is associated with simultaneous engagement in multiple delinquent behaviors and the extent to which risks are similar for gang participation and multi-type delinquency.

To help fill this gap in the literature, we examined gang membership together with three serious delinquent behaviors: (a) drug selling, (b) serious theft, and (c) serious violence. We selected these behaviors due to the attention they have received in the media and the scholarly literature (Howell, 2012; Loeber, Farrington, Stouthamer-Loeber, & White, 2008). Using data collected from early adolescence to young adulthood (ages 9–28), we first described the extent to which gang and non-gang youth combined drug selling, serious theft, and serious violence or specialized in one type of delinquency. We then examined whether gang participation and particular configurations of serious delinquency shared common risk and protective factors.

We used data from the Pittsburgh Youth Study (Loeber et al., 2008; Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998), which is well suited to address these issues given its annual assessments, its oversampling of boys at risk of delinquency, and its high response rates initially and over time. Pittsburgh is informative because it is a small city with a recently emergent gang problem, in contrast to larger cities like Chicago and Los Angeles, which have longer traditions of gang activity and research (Howell, 2012). Gang activity and homicides in Pittsburgh escalated in the early 1990s coincident with the crack cocaine epidemic, peaking just prior to the middle of the decade, and then falling through the late 1990s (Cohen & Tita, 1999; Cork, 1999; Kelly & Ove, 1999; Mamula, 1997).

Background and Prior Research

Scholars have longstanding interest in typologies of crime and delinquency, including the possibility of both specialists and generalists in crime (Farrington, Snyder, & Finnegan, 1988; Sullivan, McGloin, Ray, & Caudy, 2009; White & Labouvie, 1994). The question of specialization is relevant to gang research because images of inner-city drug supermarkets embroiled in violence and young super predators engaged in a wide array of crimes are strongly embedded in media and public perceptions (e.g., Curtis, 1998; Howell, 2012; Kelly & Ove, 1999; Thompson, Brownfield, & Sorenson, 1996). These perceptions call to mind versatile delinquents who engage in more than one type of crime within a short span of time, especially drug sales combined with extreme violence (e.g., armed robbery, aggravated assault) or those activities plus serious theft (e.g., burglary, dealing in stolen goods). On the other hand, gang research also suggests that some gangs are purely territorial and may specialize in violence in order to protect their turf (Coughlin & Venkatesh, 2003). Surprisingly, person-oriented analyses of prospective, representative samples have not documented which of these possible configurations of serious delinquency is most likely among gang members.

Although an increasing number of studies using latent class analyses have examined constellations of delinquent behavior, these studies offer limited insight into the co-occurrence of delinquency typical of gang members. For example, we are aware of only one

latent class analysis of delinquent behavior that explicitly included an indicator of gang membership (Thompson, Brownfield, & Sorenson, 1996); most instead included group or gang fighting (Dembo & Schmeidler, 2003; Dembo, Williams, Fagan, & Schmeidler, 1994; Kulik, Stein, & Sarbin, 1968). It is also the case that prior latent class analyses were not focused sharply on serious delinquency—drug selling, serious violence, and serious theft—in relation to gang association. Instead, latent class analyses have included a wide array of activities, often minor delinquency, antisocial or risky behaviors (such as shoplifting, sexual activity, and failing to use seatbelts), or a total delinquency score encompassing such behaviors (Childs & Sullivan, 2013; Dembo et al., 2011, 2012; Hasking, Scheier, & Abdallah, 2011; Thompson, Brownfield, & Sorenson, 1998; Willoughby, Chalmers, & Busseri, 2004).

Thompson, Brownfield, and Sorenson's (1996) latent class analysis of the Seattle Youth Study is most relevant to this paper because it had a central focus on testing whether gang members were delinquency specialists or generalists. Their analyses revealed two classes among both gang and non-gang youth: non-delinquents and delinquent generalists. In other words, neither gang nor non-gang youth were found to be specialists. Their study was limited, however, by not including drug selling, focusing on minor to moderate theft and violence (taking things worth over \$50, beating up or hurting someone on purpose) along with drug use, analyzing a single time point with a limited age range (tenth, eleventh, and twelfth graders), and not considering correlates of delinquency classes in a multivariate framework. Latent class analysis is also not ideal for all tests of specialization, particularly those like ours in which the nature of specialization is of interest—which types of crime are combined or specialized—nor situations with a small number of indicators of occurrence (Sullivan et al., 2009).

Other studies offer additional insight into overlap between gang membership and specific types of delinquency, but primarily in a descriptive manner and not focused on co-occurrence within the same time period. For instance, Rosenfeld, White, and Esbensen (2012) documented that over two-thirds of gang members in the Pittsburgh Youth Study (PYS) sold drugs and about half engaged in serious theft or serious violence at some point during adolescence. White, Loeber, and Farrington's (2008) analyses of the developmental sequence in onset for PYS youth who engaged in pairs of problem behaviors suggest at least some same-time co-occurrence; in more cases than not, the authors found that the onset of gang membership occurred within one year of the onset of drug selling, serious theft, and serious violence. Neither of these prior analyses specifically identified the patterns of serious delinquency engaged in by gang members within the same time period, however, nor correlates of co-occurrence.

Still other prior studies are variable-centered, looking at how gang membership correlates with delinquency. These studies have demonstrated an elevation in many types of delinquency when youth were active in gangs, but did not address whether all youth engaged in all acts or some specialized in certain types and others in other types. For example, in prior analyses of the PYS, Gordon and colleagues (2004) found that gang members' delinquency was significantly higher in periods of active gang membership than before; this was true across delinquency types, including drug sales, violent delinquency, and property

delinquency. In the Rochester Youth Development Study, Thornberry, Krohn, Lizotte, Smith, and Tobin (2003) similarly demonstrated that gang members reported significantly higher delinquency during than before gang membership. An analysis of variance of the Seattle Social Development Project data found that gang membership was associated with violent delinquency and drug selling but not non-violent delinquency (Battin, Hill, Abbott, Catalano, & Hawkins, 1998). More recently, using a novel item response theory approach, Melde and Esbensen (2013) examined whether gang youth specialized in violence with data from the National Evaluation of the Gang Resistance Education and Training Program. Their results suggested an effect of gang membership on increased delinquency and an additional effect on increased violence, above and beyond this general effect. However, none of these studies examined the extent to which gang-involved youth engage in a wide variety of delinquents acts while active in the gang versus engaging in more specialized types of offending behavior (e.g., violence only) as gang members. It is also the case that prior variable-oriented studies have typically used all non-gang youth as a reference group, and it is possible that gang-involved youth differ less from other boys who are delinquent but not in gangs.

Also relevant to our study are previous developmental taxonomies of antisocial behavior and prior studies of specialization and versatility in crime and delinquency over the life course (Moffitt, 1993, 2007; Patterson & Yoerger, 1997; Sullivan et al., 2009). Importantly, these studies consider specialization or versatility over a long time span (from childhood into adulthood), in contrast to our focus on engagement in one versus multiple types of delinquency within a short time span (a prior year). Our interest is in identifying whether youth are more likely to engage in multiple types of serious delinquency—and especially particular combinations of serious delinquency such as drug selling and serious violence—during a time period when they are gang members than they do in time periods when they are not gang members.

Even with these different objectives, our study is relevant to this literature on developmental taxonomies, and we made several analytic decisions so that our findings might be maximally informative. A central feature of such taxonomies is distinction between youth whose antisocial behavior starts early and persists over time (i.e., “early onset” and “life-course persistent” delinquents) and youth who exhibit antisocial behavior only during adolescence (i.e., “adolescence-limited” delinquents; Moffitt, 1993, 2007). Importantly, this perspective recognizes general developmental trends in antisocial behavior, including elevation for all youth during adolescence due, for example, to increases in peer influence. One hypothesis we draw from this perspective is that whereas all adolescents may be vulnerable to joining gangs and engaging in any patterns of delinquency associated with gang membership, the early starting boys (who were already antisocial early in childhood) should have greater risks for gang membership and concomitant behaviors, a hypothesis that we test with interactions described below. We also document general developmental trends by examining the prevalence of gang membership and serious delinquency patterns over time expecting to see peaks for all youth during adolescence.

We furthermore set up our analyses to examine the intersection of developmental and contextual risks. As noted above, our data cover a historical time period during which gang

activity and related serious delinquency rose and fell across the nation, including in our study city of Pittsburgh. The boys in our study experienced this epoch at different ages, because they were drawn from two distinct cohorts. The youngest cohort was ages 12 to 16 at the middle of the 1990s, the approximate peak of the crack cocaine epidemic, whereas the boys in the oldest cohort were ages 19 to 23 at mid-decade. Given their different ages in this historical period, we anticipated that cohort might moderate both general developmental trends and associations between our focal variables and outcomes. That is, the peak in gang activity and associated patterns of serious delinquency might occur at different ages for the two cohorts and the strength of the gang-delinquency association might vary between the cohorts as well. We specified our models to test for such moderation. To justify combining the two cohorts together in a single analysis, we also tested for moderation by cohort in the association of covariates with gang activity and with serious delinquency patterns. We describe these models in the Method section.

Current study

This paper contributes to the existing developmental literature by documenting the extent to which young men's gang membership coincides with three aspects of serious delinquency and by testing whether similar risk and protective factors are associated with certain configurations of delinquency and gang involvement. We consider two novel research questions. First, we examine what combinations of serious delinquent acts (drug sales, serious theft, serious violence) are more likely among gang members versus non-gang involved youth. We sharpen the comparison beyond prior studies by focusing on young men who ever engaged in serious delinquency over the course of the study. We hypothesize that gang members' delinquency patterns would be concentrated within several types, because other research suggests that some gangs are strictly territorial (and may promote only violence), whereas others engage in drug trafficking (and thus members may deal drugs and brandish weapons in order to protect drug territory), and others are broadly immersed in crime (and may not only deal drugs but also stolen goods, and may use violence to control both markets). Secondly, we consider what background characteristics associate with youth's chances of engaging in these sets of serious delinquent acts, and, we test whether these correlates are similar for gang and non-gang involved youth.

Method

Sample

We used longitudinal data from the PYS. Participants were initially selected from a list of boys provided by the Pittsburgh Board of Education in 1987 (Loeber et al., 1998; Loeber et al., 2008). Approximately 84% of eligible boys initially participated, and at least 70% of youth were interviewed at all of the follow-up time points (Loeber et al., 2008). We applied sampling weights to adjust for the study's oversampling of boys at risk of delinquency. The majority of boys were Black (62%) and of lower socio-economic status (12% of parents had less than a high school degree, 62% only a high school degree, and 26% some college or a college degree; 22% of youth lived with both of their biological parents).

Table 1 provides the developmental and historical timing of the study and indicates the waves that we focused on from the full PYS study. In particular, we included two cohorts, boys who were in the first and seventh grades at screening (youngest and oldest cohorts, respectively), because the middle cohort was followed infrequently due to funding restrictions. For the youngest and oldest cohorts, we included 10 annual study waves in which the youth reported their gang participation and engagement in serious delinquency in the prior 12 months (since the last interview) based on the same questions (see Table S1 in the online supporting information). This common set of questions began about 4 years after the start of the full PYS study. For clarity, we refer to the first two PYS study waves (the screening wave and first full data collection point, which occurred 6 months after screening) as baseline and we use some measures from baseline as covariates. We refer to the first time point where we begin examining gang membership and serious delinquency as the start of our focal decade. The ages of the boys varied at baseline and ranged between ages 5 and 9 for the youngest cohort and between ages 12 and 16 for the oldest (see again Table 1). The focal decade began in 1991 to 1992 for the youngest cohort and 1990 to 1992 for the oldest cohort, when boys were approximately three to four years older than baseline. Our focal decade ended for the youngest cohort in 2000 to 2002 when boys were ages 18 to 22 and for the oldest cohort in 1999 to 2002 when they were ages 24 to 28. At mid-decade, when the crack cocaine epidemic was peaking, the boys in the youngest cohort were ages 12 to 16 and the boys in the oldest cohort were ages 19 to 23. We discuss below how we modeled developmental ages, historical time periods, and cohort.

To address missing data, we implemented multiple imputations with the *mi* suite in Stata 12 to create 25 replicate data sets with chained imputation and to combine estimates with Rubin's rules (Johnson & Young, 2011; Rubin, 1996). We required participation in at least half of the 10 waves of our focal decade; 79 boys who participated in four or fewer waves were excluded, leaving 930 young men (the excluded and included boys did not differ significantly on baseline characteristics, including their own early antisocial behavior and delinquent peers; results available from the authors).

We appended together the 10 waves of data from our focal decade for each participant; thus, each of the 930 youth had 10 records in the data file producing 9,300 records (or "person-periods") in total. Each time-constant variable (e.g., race and antisocial behavior at baseline) was repeated on each record. In other words, within each participant, the 10 records had the same value for these time-constant variables. Each time-varying variable (e.g., study wave, calendar year, and youth's age as well as gang membership status and serious delinquency during the reference period for the current wave) was indicated on the appropriate record. For example, each participant's first record reflected his reports at the first of the 10 focal waves; and, each participant's 10 records could have different values for these time-varying variables, reflecting his responses at each of the 10 study waves. As discussed further below, we used robust standard errors to adjust for the clustering of multiple time periods within participants.

The sample sizes reported in the tables are smaller than 930 youth and 9,300 person-periods because we excluded those who never reported serious delinquency (i.e., serious violence, serious theft, and drug selling; see below) across the 10 study waves (in order to sharpen the

comparison with gang members) and we excluded waves when youth reported being incarcerated (because during these times their deviant behaviors were institutionally restricted). Because both wave-specific serious delinquency and incarceration status were imputed variables, the sample sizes varied across our 25 replicate data sets. Across these replicates, our final samples included 628 to 646 young men (274 to 284 from the youngest cohort and 351 to 363 from the oldest cohort) and 5,732 to 5,848 person-periods.

Measures

Each wave of the focal decade included self-reports of gang membership and serious delinquent activity. These data allowed us to examine how many youth engaged in various configurations of serious delinquent behaviors concurrently in the reference period (the year between the prior and current wave) and how gang membership and covariates related to their chances of doing so. The study also measured numerous covariates which prior research has identified as important precursors to delinquency and gang participation (see Loeber et al., 2008 and Tables S1–S5 of the online supporting information for additional details on study measures).

Gang membership and serious delinquency

Across the 10 focal study waves, interviewers asked each participant whether he had been a member of a gang in the past year (since the prior wave). In an extensive analysis of various techniques for measuring gang membership, Esbensen, Winfree, He, and Taylor (2001, p. 124) concluded that this “self-nomination technique is a particularly robust measure of gang membership capable of distinguishing gang from nongang youth” and it has been used in much of the gang literature (Howell, 2012). Each participant also completed the Self-Reported Delinquency Scale (Elliott, Huizinga, & Ageton, 1985). We defined drug selling as self-reported selling of either “soft” (marijuana or hashish) or “hard” (heroin, cocaine, or LSD) drugs in the reference period (the past year, since the prior wave). We also used past year engagement in any serious theft (i.e., yes to any of four items: breaking into a building to steal something; stealing a car or motorcycle; driving a motor vehicle without the owner’s permission; dealing stolen goods) and serious violence (i.e., yes to any of three items: carrying a hidden weapon; attacking others with a weapon to hurt or kill them; using a weapon or force to get money or things from others).

Because of our interest in configurations of delinquency, we defined several additional variables based on the self-reports. We created an indicator of whether the participant had engaged in *any* of the three types of delinquency. For each type, we also distinguished whether he reported either of the other two types in that year or just the single activity. Finally, we created an eight category variable capturing all eight possible configurations of the three types of serious delinquency: (a) none, (b) drug sales only, (c) theft only, (d) violence only, (e) drug sales and theft, (f) drug sales and violence, (g) theft and violence, and (h) drug sales, theft, and violence. To evaluate our various research questions, we also created two indicators of gang membership: any membership across the 10 focal study waves and any membership in the reference period (the year between the prior and current study wave). For some analyses we also coded participants into three categories: (a) never a

gang member across the focal decade, (b) ever a gang member but not in the year before the study wave, and (c) ever a gang member including in the year before the study wave.

Time dimensions—Our longitudinal data had multiple time dimensions, reflecting age, period, and cohort. We expected non-linear patterns for period and age, given the peak of the crack cocaine epidemic in the mid-1990s (noted above) and the well-established elevation of many types of delinquency in mid-adolescence (Farrington 1986; Loeber et al., 2008). We therefore dummy coded historical time (early 1990s: 1990 to 1993; mid 1990s: 1994 to 1996; late 1990s and early 2000s: 1997 to 2002) and included a quadratic term for age (which was coded in years, with decimals for months). We also controlled for cohort (1=oldest; 0=youngest). Table S2 in the online supporting information provides descriptive statistics for these variables.

Covariates—A number of additional variables drawn from the baseline interviews (screening and first assessment) were included as covariates. These baseline covariates included the youth's reading score on the California Achievement Test (CAT, a nationally normed achievement test used in public schools), his report of the proportion of his friends who were involved in conventional activities and who were involved in antisocial or delinquent activities, his reports of his own antisocial behaviors, and his parent's report of neighborhood problems. Reports about conventional peers and neighborhood problems were based on exactly the same questions for both cohorts, but questions about own and peers' antisocial activity differed somewhat between cohorts at baseline (see Tables S3 to S5 in the online supporting information). The measures of the boys' own and peers' behaviors and neighborhood perceptions were adapted for the study largely from the National Youth Survey (Elliott et al., 1985; see Loeber et al., 2008). Due to skewness, we logged the reports of own and peers' antisocial behaviors as well as parent's reports of neighborhood problems. We also controlled for whether the youth's race was Black (vs. non-Black), and the biological parents' highest level of education (less than high school, high school only, some college or more). Additionally we included two time varying covariates: an indicator of whether both of the biological parents lived in the household and an indicator of whether the youth had moved to a new census tract between the prior and current interview.

Early delinquency—We examined potential moderation by youth's early delinquency, for both methodological and substantive reasons. We were concerned that boys who had already engaged in gangs or serious delinquency by the start of the PYS study might differ from those who had not. We also wanted to consider the conceptual frameworks reviewed above (e.g., Moffit, 1993; Patterson & Yoerger, 1997) that distinguish between boys who are antisocial early in life and maintain antisocial activities across the life course (although with different manifestations, depending on the developmental period) and boys who are antisocial only during adolescence.

We first considered moderation by an indicator of whether boys had engaged in the outcome behaviors by baseline. About 1% had sold drugs and 2% had been gang members by baseline. Fully 11% had engaged in serious theft and 20% in serious violence by that time point. In total, one-quarter had engaged in at least one of the four behaviors (gang membership or serious delinquency) by baseline. We tested whether covariate associations

differed for youth who had and had not engaged in serious delinquency or gang membership by baseline and found that they did not. Specifically, the set of interactions between a dichotomous indicator of prior behavior and all of the covariates listed in Table S2 of the online supporting information (including a square term for age) was nonsignificant, $F(105, 134495) = 1.07, p = .283$, for our eight-category variable of configurations of later serious delinquency using the multinomial logit model discussed in the next section (the 105 numerator degrees of freedom in this F test reflects one interaction term for each of 15 covariates in each of the 7 multinomial logit equations). A similar set of interactions for gang membership based on a logit model was also nonsignificant, $F(15, 30178) = 1.01, p = .442$.

We conducted a second analysis to address the fact that the measure of youth's antisocial behavior at baseline reflected different ages for youth in the youngest and oldest cohorts. To do this, we created a variable capturing the boys' self-reported antisocial behavior by age 7. Using the same items as listed in Table S3 of the online supporting information for self-reported antisocial behavior, we drew on boys' reports of whether they had ever engaged in each activity; and, for boys in the oldest cohort, the age at which they had first engaged in the activity. Doing so allowed us to define a similar early onset variable for both cohorts: The number of antisocial behaviors by age 7. This variable was logged due to skewness ($M = 0.66, SD = 0.64$). We tested whether this early onset antisocial behavior moderated the associations reported in Table 3 and Table 4. We found no significant interactions: $F(14, 31169) = 0.91, p = .551$ for moderation of the association between gang status and serious delinquency configurations; $F(98, 119515) = 1.19, p = .095$ for moderation of the association between covariates and serious delinquency configurations; and $F(14, 36196) = 0.63, p = .847$ for moderation of the association between covariates and gang participation). Based on these results, we focus on the full sample of youth (those with and without early delinquency), which increases cell sizes and power.

Analytic Approach

All analyses were conducted with Stata 12 (StataCorp, 2011). Our first research question was whether gang members were more likely to combine certain types of serious delinquency than were non-gang involved youth. To examine this question, we first calculated percentages, using Rubin's rules to combine estimates from our 25 multiply imputed data sets and applying the study's sampling weights to adjust for initial oversampling of high-risk youth (Johnson & Young, 2011; Rubin, 1996; Wooldridge, 2009). We used chi-square values to test for differences in the proportion of young men reporting each set of serious delinquent activities by gang membership status (never in a gang, ever in a gang but not in the reference period before the study wave, ever in a gang including in the reference period before the study wave). With our multiply imputed data, we first calculated the chi-square value within each of the 25 replicate data sets (based on a two by three cross-tabulation of a dichotomous variable indicating whether the youth did or did not engage in a particular configuration of delinquency and a trichotomous variable indicating the youth's gang membership status). We then combined these values with Rubin's rules. The final test statistics were F rather than chi-square values because precision of estimates based on multiple imputations depends not only on the sample size but also the number of

imputations, which are typically small enough to deviate from the normal distribution (Li, Raghunathan, & Rubin, 1991; Rubin, 1996; StataCorp, 2011). In requesting these calculations, we used the *vce(cluster)* option so that within each replicate data set robust standard errors were calculated to adjust for the clustering of multiple time points within each participant (Johnson & Young, 2011; Rubin, 1996; Wooldridge, 2009) prior to combining estimates.

We then used a multinomial logit model to test whether the odds of particular combinations of serious delinquency remained significantly higher for active gang members, even after adjusting for covariates. We again calculated these models within each of the 25 replicate data sets, adjusting for clustering of multiple time points within participants and combining the results with Rubin's rules. The multinomial logit model is similar to a logit (logistic regression) model but allows for more than two outcome categories (Long, 1997; Long & Freese, 2003). In the logit model, the probability of success (the category coded one on the outcome variable) and the probability of a failure (the category coded zero on the outcome variable) are complements, and the log of the odds is the outcome, where the odds is the ratio of these two probabilities. Logit coefficients can be exponentiated to interpret results as odds ratios. Implicitly, the failure probability is the reference outcome category for this interpretation. For example, if a dichotomous indicator of active gang membership was the outcome and a dichotomous indicator of Black race was a predictor variable then an odds ratio statistically larger than one would indicate that Black versus non-Black youth had higher odds of being gang members than being non-gang members.

In the multinomial logit model, odds ratios can be calculated for each pair of outcome categories. One outcome category must be explicitly selected as reference for model estimation. Odds ratios for each of the outcome categories versus the reference outcome category can be read from the default output. The remaining odds ratios for other pairs of outcome categories can be calculated by re-estimating the model with another reference category or by using post-estimation commands. We used post-estimation commands in Stata to recover odds ratios for all of the 28 possible contrasts among the eight configurations of serious delinquency defined above. Because of the many individual tests, we first used an omnibus test of the null hypothesis that all of the contrasts were zero versus the alternative that at least one of the contrasts differed significantly from zero (Long, 1997; Long & Freese, 2003). This *F* test has 14 numerator degrees of freedom accounting for the 14 coefficients for the two indicators of the three gang-status categories (never in a gang, ever in a gang but not in the reference period, ever in a gang including in the reference period) across the seven default equations for the eight outcome categories.

We used similar models and calculations to examine our second question regarding risk and protective factors for serious delinquency and gang membership. To determine whether covariates were differentially associated with each configuration of serious delinquency among young men who were and were not involved in gangs, we tested interactions of our dichotomous indicator of ever or never a gang member with each of our 15 covariates. Because of the large number of individual tests, we first tested the joint significance of this set of interactions based on an *F* test (combining estimates with Rubin's rules). As noted, the multinomial logit model produces a set of coefficients for all but the reference outcome

category—seven sets of interactions given our eight outcome categories—and thus there were $7 \times 15 = 105$ interactions in all (and thus 105 numerator degrees of freedom for this F test). After obtaining a significant overall F test, we then used additional F tests to see which covariates had significant interactions, first jointly testing the seven interaction terms for each covariate and then considering which individual interaction terms were significant. We also estimated a “main effects” multinomial logit model (without interactions) and calculated an F value to test whether the covariate’s main effect was statistically significant across the seven equations (this F value had 7 numerator degrees of freedom). In addition to these multinomial logit models, we also estimated a logit model with active gang membership in the reference period before the current study wave as the outcome and our 15 covariates. Because there is only one equation for these logit models, the relevant F tests for each of the 15 covariates has just one numerator degree of freedom.

For both the outcomes of configurations of serious delinquency and of active gang membership, we also tested for interactions by the three time dimensions in our data: youth’s age, historical period, and cohort. Doing so provided statistical justification for combining the two PYS cohorts in a single analysis. It also allowed us to examine whether developmental patterns of combining the three types of serious delinquency and of participating in gangs depended on our covariates (e.g., differed for Black and non-Black youth or for boys living with both biological parents versus one or no biological parents) and whether covariates likewise moderated time trends across calendar year in these activities.

To facilitate interpretation, we calculated the predicted probability of youth occupying each outcome category. For significant covariates, Figures S1–S12 of the online supporting information graph these predicted probabilities, which we summarize in the text below. We used predicted probabilities for interpretation because logit models are inherently non-linear and because the substantive size of statistically significant associations is more meaningful in probability than odds units (Long, 1997; Long & Freese, 2003). We made these calculations repeatedly, selecting a value of interest for a particular variable (e.g., our focal covariate of gang membership) and holding the remaining covariates constant at their means.

Results

Describing Configurations of Serious Delinquency among Delinquent Young Men Who Were and Were Not Gang-Involved

Table 2 provides the percentage of waves at which youth reported having engaged in drug selling, serious theft, and serious violence since the last interview, among all youth and by gang membership status (never in a gang across the 10 study waves, ever in a gang but not in the reference period for the current wave, ever in a gang including during the reference period for the current wave). Recall that we restricted the sample to young men who reported serious delinquency at least once during the 10 focal study waves, but not necessarily at every wave, and therefore young men can fall in the “no serious delinquency” category at any given wave. The table also summarizes the significance tests used to identify which values differed significantly among the three gang-status groups. Because most

values differed significantly, we indicated non-significant contrasts with subscript letters; within rows, values with the same subscript letter did not differ significantly (see Table 2).

A major contribution of the current study is examining what types of serious delinquency gang members combined. We therefore organized Table 2 to emphasize what looking at combinations of activities revealed that was not evident when we looked at each activity on its own. The first rows replicate prior research (including with the PYS; Gordon et al., 2004, White et al., 2008) by confirming that gang members engaged in more delinquency than did non-gang involved youth and that the elevation in delinquency among gang youth occurred primarily during spells of active gang membership. For example, the second row of Table 2 shows that young men who had reported serious delinquency at some point across the 10 focal study waves, but never reported gang membership, said they were involved in some kind of serious delinquency at just about one-third (31%) of study waves. In contrast, gang-involved young men reported serious delinquency more often, especially during the waves when they were in a gang (79%) versus waves when they were not in a gang (41%). Similar patterns were seen for any drug sales and any serious violence (rows 3 and 9 of Table 2). For serious theft (row 6), reports were highest among active gang members; however, in periods before and after gang participation these youth reported serious theft at a similar proportion of waves as did youth who were never in gangs.

The additional rows of the table provide new information, extending prior studies by showing that gang-involved youth were especially likely to combine multiple types of delinquency, that this multi-type delinquent activity was most elevated during their spells of active gang participation, and that this elevation was restricted to a subset of configurations of delinquency. To begin, the middle rows of Table 2 show that, during active gang membership, the increase of each type of delinquent activity was larger in combination with another activity (rows 5, 8, and 11) than on its own (rows 4, 7, and 10). For instance, gang-involved youth combined drug selling with other serious delinquency during 48% of the waves when they were active gang members; they did so during just 13% of the waves before or after gang membership (row 5; final two columns). Serious theft combined with another activity and serious violence combined with another activity were likewise over 3 times higher during active gang membership than before or after (rows 8 and 11; final two columns). In contrast, specialization in a single activity increased less or not at all when young men participated in gangs. For serious violence only, a smaller increase of 1.5 times was evident (18% versus 13%; row 10). Specialization in theft (row 7) was equally likely across the three gang-status groups. Specialization in drug selling (row 4) was less likely when gang-involved youth were in the gang versus before or after gang membership and versus delinquent youth who were never in gangs.

The bottom rows of Table 2 elaborate these results, showing the specific types of serious delinquency that young men combined and revealing that two particular sets of activities (i.e., drug selling and violence; drug selling, theft, and violence) were most elevated when youth were in gangs. Among young men who were ever in gangs, the percentage who engaged in these activities was 4 to 5 times higher during waves of active gang membership than during waves before or after gang membership (26% versus 7% for drug sales and violence in row 13; 20% versus 5% for all three serious delinquent activities in row 15).

Combining serious theft and serious violence was also elevated during periods of active gang membership, but less so (7% versus 3%; row 14). The configuration of engaging in drug sales and serious theft without serious violence was rare for all youth, at 1% to 2% even among active gang members (row 12).

Modeling Configurations of Serious Delinquency among Delinquent Young Men Who Were and Were Not Gang-Involved

Table 3 summarizes results from a multinomial logit model of configurations of serious delinquency based on gang membership status. As discussed above, we first tested for moderation by the study's three time dimensions (i.e., historical period, developmental age, and cohort). Two of the omnibus tests were not significant: $F(14, 42161) = 1.29, p = .202$ for interactions by cohort and $F(28, 85844) = 1.22, p = .196$ for interactions by youth's age. One omnibus test was significant: $F(28, 981) = 3.41, p < .0001$ for interactions by historical time; however, the individual tests were significant only for one of the outcome categories: $F(4, 103) = 3.84, p < .001$ for combining drug sales and theft. Given that only 2% or less of youth engaged in this combination of serious delinquency, very few cases were included in the test of this interaction. Across the three historical periods and three gang status categories, the percentage of boys engaged in both drug sales and serious theft remained less than 2%, suggesting the interaction had little substantive importance.

Because there was no evidence of moderation by cohort or youth age, and very little evidence of moderation by historical period, we next ran a main effects model. The omnibus test revealed evidence of significant associations between gang status and configurations of serious delinquency, $F(14, 45389) = 22.02, p < .0001$. We used the post-estimation commands described above to calculate the value and significance of all 28 odds ratios with all possible outcome reference categories in order to see which individual odds ratios were significant. Table 3 lists the pairs of predictor categories in the columns and the pairs of outcome categories in the rows. The predictor contrasts were organized so that the reference was either youth who were never in gangs (columns 1 and 2) or youth who were ever in gangs but not in the reference period before the current wave (column 3). Outcome contrasts were organized to start with the three configurations that we expected to be elevated during gang participation (drug selling, serious theft, and serious violence; drug selling and serious violence; serious violence only) in comparison to each other configuration as reference (listing each contrast pair only once, so each subsequent set, in lower table rows, has one fewer comparison than the prior set, in higher table rows). We then listed the remaining contrasts for another configuration that we found was associated with gang participation in our descriptive analyses: serious theft and serious violence. Finally, we listed all remaining contrasts. Asterisks indicate odds ratios that differed significantly from one.

For example, the value of 10.45 in the top right corner of Table 3 is an odds ratio for engaging in all three serious delinquent activities (drug sales, serious theft, and serious violence) versus no delinquent activities (reference outcome category) for gang-involved youth in the periods of active gang participation versus the periods before or after gang participation (reference predictor category). The asterisk indicates that this value is significantly larger than one. The value can be interpreted as follows: the odds of gang-

involved youth reporting all three versus no types of serious delinquency was over 10 times higher during periods of active gang membership than in the periods leading up to or following gang membership.

Looking across the pattern of statistical significance in Table 3 leads to several conclusions. First, the odds ratios are significant for two configurations—drug sales, serious theft, and serious violence; drug sales and serious violence—in comparison to every other configuration of delinquency (rows 1 to 13) for the predictor contrasts comparing the behaviors of active gang members to their own behavior in the periods before or after gang membership (column 3) as well as comparing the behavior of active gang members to the behavior of youth who were seriously delinquent at some point but never in a gang (column 2). The only exception is in row 7, which indicates that the odds of these two configurations did not differ significantly from each other. All together these results confirm that these two configurations were equally and substantially elevated when youth were active in gangs. The results in column 1 show that the behavior of future and former gang members differed from non-gang involved delinquent youth on these two configurations of delinquency in comparison to some configurations of delinquency (rows 1–4 and 8–11). However, for the same reference category, the odds ratios were much smaller than those already discussed, involving active gang members.

The odds ratios for the third configuration of delinquency—specialization in serious violence (rows 14 to 18)—were also significant with some other configurations of serious delinquency as the reference outcome category, although others were not significant, and the odds ratios were much smaller than in rows 1 to 13. For example, the odds ratio of 3.34 in the last column of row 14 is just one-third the size of the odds ratios in rows 1 and 8. Rows 19 to 22 show that the configuration combining serious theft and serious violence was also elevated significantly in relation to three of the remaining outcome categories, although again smaller in magnitude than the odds ratios for the same reference category in rows 1 to 13 (e.g., 5.18 in the last column of row 19). Of note, the outcome categories of focus in rows 14 to 18 (serious violence only) and in rows 19 to 22 (serious theft in combination with serious violence) did not differ significantly from each other (see row 18); this means that these two outcomes were equally (but modestly) elevated during periods of active gang membership. The odds for the remaining configurations of serious delinquency (drug sales and theft; theft only; drug sales only) shown in rows 23 to 28 were also not significant, meaning that young men's chances of engaging in these sets of delinquent acts in comparison to the remaining reference categories did not depend on their gang membership status.

Protective and Risk Factors for Configurations of Delinquency and Gang Membership

In the final set of analyses, we examined protective and risk factors for the serious delinquency configurations and gang membership. We first tested whether the associations between covariates and outcomes differed by each of the three time dimensions—youth's ages, historical period, and cohort—as well as whether associations between covariates and configurations of serious delinquency differed between youth who were ever and never involved with gangs. In initial omnibus tests, we found each set of interaction terms was

significant (results shown in Table S6 of the online supporting information). Therefore, in Table 4, we summarize which covariates had significant interaction terms and which had significant main effects in associating with configurations of serious delinquency (columns 1 and 2) and in associating with whether the young man was in a gang in the reference period before the current wave (columns 3 and 4). In the text that follows, we discuss the substantive direction of associations (graphs of predicted probabilities and additional statistical tests are presented in Figures S1 to S12 of the online supporting information).

There are several conclusions that can be drawn from the pattern of statistical significance shown in Table 4. First, relatively few interactions were significant for individual covariates and particular outcomes. Just four interactions were significant for cohort, providing considerable support for combining the two cohorts in a single analysis. Only two sets of interactions were significant for age, suggesting that most developmental trends were similar across subgroups. Historical period likewise moderated just four constructs, indicating comparable time trends across most covariate levels.

Looking at the main effects reveals that whereas just two covariates were significantly associated with configurations of serious delinquency, and no covariate interactions were significant, six covariates were significantly associated with gang membership, with four sets of significant interactions. Because the two significant covariates of serious delinquency configurations were also associated with gang membership, we organized the presentation of results below by focusing first on the time dimensions, then the common predictors of serious delinquency configurations and gang membership, and finally the unique predictors of gang membership. Where appropriate, we discussed moderated associations. In order to reduce the volume of results, the presentation is focused on the four configurations of delinquency that were associated with gang participation (see again Table 3).

Time dimensions—Gang participation and multi-type delinquency were limited to adolescence, often with variation across subgroups (details shown in Figures S1 to S3 of the online supporting information). Multi-type delinquency peaked at about age 15 for theft and violence (for all youth), about age 17 for combining all three types of serious delinquency (for the youngest cohort), at about age 19 for combined drug sales and serious violence (for all youth), and at about age 19 for combining all three types of serious delinquency (for the oldest cohort). In contrast, specialization in serious violence started out at its highest level in late childhood and then declined steadily across adolescence. Gang participation peaked around age 16, but only among youth living with just one or neither biological parent; the chances of joining a gang did not vary significantly by age for boys living with both biological parents.

Generally, historical time was unrelated to youth's chances of engaging in multi-type delinquency (see again Table 4). However, the expected peak in the middle 1990s was evident for gang membership among youth whose parents had less than a high school education. For boys whose parents had a high school education or some college education, the chances of participating in a gang were statistically equivalent in early and middle 1990s, but dropped significantly during the late 1990s and early 2000s. Additionally, boys' chances of combining drug sales with violence also showed the expected peak at mid-

decade, but only among boys who were ever in a gang. Among boys who were never in a gang, the chances of combining drug sales with violence were much lower overall, and increased slightly across the decade. In addition to moderation of youth's age with cohort discussed above, historical period moderated developmental trends in combining all three types of serious delinquency. The mid-adolescence peak in this delinquency combination was evident only in the early and middle 1990s; boys' chances of engaging in all three types of delinquency were much lower in the late 1990s and early 2000s.

In addition to moderation by cohort, we found a main effect for cohort in predicting youth's chances of specializing in violence, with the oldest cohort exhibiting higher levels. The two cohorts also had similar levels of gang participation in the early and middle 1990s, but the youngest cohort had higher levels in the late 1990s and early 2000s.

Common covariates—Table 4 shows that residential mobility and race significantly predicted both serious delinquency configurations and active gang membership. Similar patterns of associations occurred for gang participation and for the two delinquency outcomes most associated with gang membership: drug selling along with serious violence and all three types of serious delinquency. For each outcome, having moved in the prior year elevated the probability of engaging in the activities. In contrast, residential mobility was not significantly associated with the chances that boys would specialize in serious violence or combine serious theft and serious violence.

Race was associated with specializing in violence, combining theft with violence, and combining drug sales with violence, in addition to gang membership. The association differed depending on the outcomes, however. Black, compared to non-Black, young men were less likely to specialize in serious violence or to combine serious theft and serious violence. In contrast, Black, compared to non-Black, young men were more likely to combine drug sales with violence and to participate in gangs (especially in the mid 1990s). Race was not significantly associated with the chances of boys' combining all three types of serious delinquency.

Unique covariates—In addition to the moderated associations already discussed, youth's reading scores and youth's antisocial activities at baseline (the latter was moderated by cohort) were associated with active gang membership. Specifically, youth with lower, compared to higher, reading scores at baseline were more likely to join a gang. In the oldest cohort, boys who reported higher antisocial activities at baseline were more likely to later join gangs. In contrast, for the youngest cohort, self-reported antisocial activities at baseline were unrelated to later gang participation.

Discussion

In this paper, we examined the extent to which gang members and non-members from the PYS combined drug selling, serious theft, and serious violence or specialized in one type of serious delinquency. Our results extend prior studies by demonstrating that gang members' elevated delinquency is concentrated in two combinations: (a) drug selling and serious violence or (b) drug selling, serious theft, and serious violence. By focusing on young men

who were ever seriously delinquent, we also sharpened the comparison group from prior studies, which have often included non-delinquents. The evidence for particular forms of multi-type delinquency is consistent with gangs using violence in instrumental ways, as a means to make money either by protecting drug territory or by supporting the acquisition and selling of stolen goods as well as drugs, at least in Pittsburgh in the 1990s. We cannot say whether the results would extend to other cities in the period, or to contemporary times, and encourage future attempts to examine multiple aspects of serious delinquency in a single study and to identify the co-occurrence of those behaviors.

We also found that several risk factors were related to both gang membership and the multi-type serious delinquency most associated with gang membership (drug selling and serious violence; drug selling, serious theft, and serious violence); relationships differed for boys who specialized in serious violence and those who combined serious violence with serious theft. These results suggest that young men drawn into gangs and into combining extreme violence with drug selling or with both drug selling and serious theft may share common developmental, familial, and contextual risks. For instance, gang activity peaked in the middle 1990s for boys whose parents had less than a high school education; and, gang-involved youth were most likely to combine drug sales with serious violence in this historical period. Moving to a new neighborhood was also associated with multi-type delinquency and gang entry, highlighting the challenges that youth from poor urban neighborhoods may face when they cross territorial boundaries. Gang membership and multi-type delinquency also peaked in middle to late adolescence for most youth, whereas specialization in serious violence declined steadily with age. Additionally, Black youth were less likely to engage only in serious violence or to combine serious theft and serious violence than non-Black youth, but were more likely to join gangs and to combine violence with drug sales.

Together, these findings highlight that both gang involvement and certain kinds of multi-type delinquency are limited to adolescence and that different youth may be more vulnerable at different times (i.e., young men who come of age during periods of heightened street crime, Black youth who may on average be exposed to greater contextual risk, and youth whose moves to new neighborhoods exposes them to increased risk). Our results also underscore the fruitfulness of distinguishing developmental patterns of co-occurring drug selling and serious violence or drug selling, serious theft, and serious violence from specialization in serious violence, combining serious violence and serious theft, or other configurations of serious delinquency in future studies of gang members. We encourage replication of our findings and the use of theories of developmental and life-course criminology to illuminate them (Farrington, 2003; Le Blanc & Loeber, 1998; Loeber, White, & Burke, 2012). We also encourage extension of our results to identify latent groups with different over-time changes in multi-type delinquency, for example by using repeated measures latent class analyses of the types of co-occurrence variables that we defined at each wave (Collins & Lanza, 2010) or by using multilevel latent class models which establish latent classes of types of delinquency within waves and then latent classes with different across-wave patterns of these delinquency types (Vermunt, 2003, 2008). In these ways, our within-time focus on specialization and versatility in a particular year might be combined with an over-time focus, allowing for the identification of specialization or

versatility in multi-type delinquency over the life course. Such models might also identify subgroups of boys who are consistently violent, but transition from specializing in violence during childhood and early adolescence to combining violence with drug selling, serious theft and gang participation in middle and late adolescence.

Our study has several limitations. As noted above, our findings may not generalize beyond Pittsburgh in the 1990s. It is also the case that even though our sample was relatively large, with over 600 participants, cell sizes became small as we looked at particular combinations of behaviors. Studies with larger sample sizes or strategic sampling for co-occurrence might be better able to identify risks associated with rare sets of serious delinquent behaviors. Measures of early antisocial behavior, defined in even more equivalent ways between cohorts, might also identify greater distinctions between boys who do and do not exhibit early problem behaviors. Finally, the PYS sampled only boys, and our findings may not generalize to girls.

With these limitations in mind, our study contributes to the existing literature. We demonstrated the substantial co-occurrence of serious delinquency among young men who joined gangs in the 1990s. Our findings encourage more studies of multiple aspects of delinquency simultaneously, with methods designed to identify and model such co-occurrence.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Time Dimensions of Study

	Youngest Cohort	Oldest Cohort
Baseline		
Grade in School	1st grade	7th grade
Boys' Ages	5 to 9	12 to 16
Calendar Years	1987 to 1989	1987 to 1989
Start of 10 Waves of Focus in the Paper ("Focal Decade")		
Boys' Ages	9 to 13	15 to 19
Calendar Years	1991 to 1992	1990 to 1992
Middle of Focal Decade		
Boys' Ages	12 to 16	19 to 23
Calendar Years	1994 to 1995	1994 to 1996
End of Focal Decade		
Boys' Ages	18 to 22	24 to 28
Calendar Years	2000 to 2002	1999 to 2002

Note. We defined the baseline as the first two study waves: the screening wave plus the first full data collection point which occurred 6 months after screening. We focus this paper's analyses on 10 waves of data collection beginning three to four years after the baseline, when gang membership and serious delinquency were asked about in the same way at each study wave. We provide boys' ages and calendar years for the beginning, middle, and final waves of the focal decade.

Table 2

Percentage of Young Men Engaged in Configurations of Drug-selling, Serious Theft, and Serious Violence: Full Sample of Boys Who Were Ever Seriously Delinquent and by Gang Membership Status

Serious Delinquency at Each Study Wave	Row	All Youth Who Ever Reported Serious Delinquency	Gang Membership		
			Never	Ever But Not Now	Ever Including Now
Any Type					
None	1	64	69	59	21
One or More	2	36	31	41	79
Single Types					
Any Drug Sales	3	17	13	21	51
Drug Sales Only	4	6	6 _a	8 _a	3
Combined with Another Activity	5	11	7	13	48
Any Serious Theft	6	13	11 _a	13 _a	32
Theft Only	7	5	5 _a	4 _a	3 _a
Combined with Another Activity	8	8	6	9	29
Any Serious Violence	9	24	19	27	71
Violence Only	10	12	11 _a	13 _a	18
Combined with Another Activity	11	12	8	14	53
Configurations					
Drug Sales & Theft	12	2	2 _a	2 _a	1 _a
Drug Sales & Violence	13	5	3	7	26
Theft & Violence	14	3	2 _a	3 _a	7
Drug Sales & Theft & Violence	15	4	2	5	20
Sample Sizes Across Replicate Datasets					
Number of Youth		628 to 646	459 to 481	184 to 198	179 to 191
Number of Person-Periods		5,732 to 5,848	4,102 to 4,247	1,232 to 1,309	346 to 364

Note. Values are percentages based on multiple imputation. Estimates from 25 replicate data sets were combined using Rubin's rules. Within each data set, we aggregated together 10 waves for each participant who had ever engaged in serious delinquency, excluding time points when they were incarcerated. The sample sizes vary across replicate data sets because serious delinquency and incarceration status were imputed variables. Now = in the reference period (the year between the prior and current wave). Within rows, values with the same subscript letter do not differ significantly from each other at $p < .05$.

Table 3

Odds Ratios for Configurations of Serious Delinquency Based on Gang Status (Ever and Now) Among Youth Who Were Ever Seriously Delinquent

Outcome: Configurations of Serious Delinquency			Focal Predictor Variable: Gang Status (Ever and Now)		
First Outcome Category in Contrast	Second Outcome Category in Contrast (Ref)	Row	Ever But Not Now Versus Never (Ref)	Ever Including Now Versus Never (Ref)	Ever Including Now Versus Ever But Not Now (Ref)
Drug Sales & Theft & Violence	None	1	2.44 *	25.46 *	10.45 *
Drug Sales & Theft & Violence	Drug Sales Only	2	1.77 *	13.72 *	7.76 *
Drug Sales & Theft & Violence	Theft Only	3	2.27 *	13.21 *	5.82 *
Drug Sales & Theft & Violence	Drug Sales & Theft	4	2.37 *	10.53 *	4.45 *
Drug Sales & Theft & Violence	Violence Only	5	1.52	4.76 *	3.13 *
Drug Sales & Theft & Violence	Theft & Violence	6	1.69	3.41 *	2.02 *
Drug Sales & Theft & Violence	Drug Sales & Violence	7	1.01	0.91	0.89
Drug Sales & Violence	None	8	2.40 *	28.09 *	11.70 *
Drug Sales & Violence	Drug Sales Only	9	1.74 *	15.13 *	8.68 *
Drug Sales & Violence	Theft Only	10	2.24 *	14.58 *	6.51 *
Drug Sales & Violence	Drug Sales & Theft	11	2.33 *	11.62 *	4.98 *
Drug Sales & Violence	Violence Only	12	1.50	5.25 *	3.51 *
Drug Sales & Violence	Theft & Violence	13	1.67	3.76 *	2.26 *
Violence Only	None	14	1.60 *	5.35 *	3.34 *
Violence Only	Drug Sales Only	15	1.16	2.88 *	2.48 *
Violence Only	Theft Only	16	1.50	2.78 *	1.86
Violence Only	Drug Sales & Theft	17	1.56	2.21	1.42
Violence Only	Theft & Violence	18	1.11	0.72	0.64
Theft & Violence	None	19	1.44	7.47 *	5.18 *
Theft & Violence	Drug Sales Only	20	1.05	4.02 *	3.84 *
Theft & Violence	Theft Only	21	1.34	3.87 *	2.88 *
Theft & Violence	Drug Sales & Theft	22	1.40	3.09	2.20
Drug Sales & Theft	None	23	1.03	2.42	2.35

Outcome: Configurations of Serious Delinquency			Focal Predictor Variable: Gang Status (Ever and Now)			
First Outcome Category in Contrast	Second Outcome Category in Contrast (Ref)	Row	Ever But Not Now Versus Never (Ref)	Ever Including Now Versus Never (Ref)	Ever Including Now Versus Ever But Not Now (Ref)	
Drug Sales & Theft	Drug Sales Only	24	0.75	1.30	1.74	
Drug Sales & Theft	Theft Only	25	0.96	1.26	1.31	
Theft Only	None	26	1.07	1.93	1.80	
Theft Only	Drug Sales Only	27	0.78	1.04	1.33	
Drug Sales Only	None	28	1.38	1.86	1.35	

Note. Values are odds ratios from multinomial logit models based on multiple imputation, combining estimates from 25 replicate datasets using Rubin's rules. All covariates listed in the Table S2 of the online supporting information were controlled. Within each dataset, we appended together 10 waves for each participant who had ever engaged in serious delinquency, excluding time points when they were incarcerated. The sample sizes vary across replicate datasets because serious delinquency and incarceration status were imputed variables ($n = 628$ to 646 young men; $n = 5,732$ to 5,848 person-periods). Ref = Reference. Now = in the reference period (the year between the prior and current wave).

* $p < .05$ (odds ratio differs significantly from one).

Table 4

Associations of Covariates With Configurations of Serious Delinquency and With Gang Membership Among Boys Who Were Ever Seriously Delinquent

	Outcome: Configurations of Serious Delinquency		Outcome: Active Gang Membership	
	Main Effects	Interactions	Main Effects	Interactions
Time Dimensions				
Oldest Cohort (7 th vs 1 st Grade) at Baseline Year of Interview (Ref: Mid-1990s)	$F(7, 55346) = 2.19^*$		$F(1, 6674) = 0.24$	Early 1990s: $F(1, 9554) = 5.02^*$
Early 1990s	$F(7, 49928) = 1.54$		$F(1, 9965) = 1.60$	
Late 1990s and Early 2000s	$F(7, 68130) = 1.18$	Drugs & Violence: Ever Gang: $F(1, 2714) = 5.88^*$	$F(1, 6876) = 13.08^*$	Cohort: $F(1, 10419) = 5.70^*$
Youth' Age	$F(7, 49230) = 6.53^*$	Drugs & Theft & Violence: Cohort: $F(1, 2553) = 4.01^*$	$F(1, 12929) = 3.27$	
		Late 1990s: $F(1, 2817) = 10.30^*$		
Youth' s Age Squared	$F(7, 38736) = 24.03^*$	Drugs & Theft & Violence: Cohort: $F(1, 2817) = 4.79^*$	$F(1, 7651) = 20.75^*$	
		Late 1990s: $F(1, 2209) = 9.23^*$		
Time-constant Covariates				
California Achievement Test Reading Scores	$F(7, 9550) = 1.91$		$F(1, 2302) = 12.23^*$	
Reports of Friends' Conventional Activities	$F(7, 3809) = 0.85$		$F(1, 514) = 0.92$	
Log of Self-Reported Antisocial Activities	$F(7, 26998) = 1.63$		$F(1, 16576) = 4.11^*$	Cohort: $F(1, 12027) = 4.65^*$
Log of Friends' Antisocial/Delinquent Activities	$F(7, 7438) = 1.04$		$F(1, 1843) = 2.09$	
Log of Parent-Reported Neighborhood Problems	$F(7, 25434) = 1.22$		$F(1, 5299) = 0.53$	
Highest Education Biological Parents (Ref: High School Only)				
Less than High School Only	$F(7, 28333) = 0.95$		$F(1, 7254) = 6.73^*$	Early 1990s: $F(1, 1722) = 4.83^*$
Some College or College Degree	$F(7, 32943) = 0.80$		$F(1, 7532) = 1.14$	
Youth is Black	$F(7, 42960) = 5.70^*$		$F(1, 15234) = 19.38^*$	Early 1990s: $F(1, 80173) = 7.43^*$
Time-varying Covariates				
Two Biological Parents in Household	$F(7, 39653) = 0.92$		$F(1, 5246) = 2.01$	Age: $F(1, 2112) = 4.87^*$
Moved in Prior Year	$F(7, 5336) = 2.91^*$		$F(1, 1033) = 8.35^*$	Age Squared: $F(1, 1689) = 5.62^*$

Note. *F* values based on multinomial logit models without and with interactions (columns 1 and 2) and logit models without and with interactions (columns 3 and 4). Estimates from 25 replicate data sets were combined using Rubin's rules. Within each dataset, we appended together 10 waves for each participant who had ever engaged in serious delinquency, excluding time points when they were incarcerated. The sample sizes vary across replicate datasets because serious delinquency and incarceration status were imputed variables ($n = 628$ to 646 young men; $n = 5,732$ to 5,848 person-periods).

*
 $p < .05$. Omnibus tests of significant interactions can be found in Table S6 of the online supporting information. Figures S1–S12 graph predicted probabilities for all significant interactions and main effects, and provide additional statistical tests to support interpretation.