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## Sex Similarities/Differences in Trajectories of Delinquency among urban Chicago Youth: The Role of Delinquent Peers

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### Abstract

A growing body of literature has recently emerged examining sex-specific pathways of offending. Yet, despite significant gains, this area of research is still rather underexplored. With a particular focus on the role of delinquent peers, this current study investigates the sex similarities/differences in offending trajectories among a large sample of urban Chicago male and female youth ( $n=3,038$ ) from 6th through 8th grade (e.g., ages 12–14). The results suggest that the pathways of offending appear to be more similar than different across sex, and that associating with delinquent peers is significantly related to baseline delinquency. Furthermore, delinquent peers significantly distinguished the moderate and high-rate trajectory groups from the non-delinquents for both males and females, yet once estimated in a more fully specified model, the role of delinquent peers appeared to be indirect (operating through its effect on baseline delinquency). Study limitations and implications for theory and policy are also discussed.

### Keywords

Sex; Trajectories; Delinquency; Social learning theory; Delinquent peers

### Introduction

Biological sex is one of the most recognizable correlates of crime/delinquency in the criminological and criminal justice literatures, particularly for serious offenses (Braithwaite 1989). Although recent evidence has begun to accumulate suggesting that the gender-gap in participation in offending may be closing for certain crimes (Steffensmeier et al. 2005), there can be little debate that males, by and large, engage in more (frequent) crime than females (Zahn et al. 2008). Despite this seemingly incontrovertible fact, this issue has continued to lead to larger debates in the literature on whether or not sex-specific theories and policies are needed.

For example, one argument posits that sex differences are to be expected, thus sex-specific theories and policies are essential. More specifically, a number of scholars supporting this viewpoint have suggested that theoretical criminology has virtually been constructed by men, and argue that our general theoretical explanations about crime and delinquency are not necessarily general because they are situated to explain male criminality (Belknap 2007, Daly and Chesney-Lind 1988, Leonard 1982; Naffine 1985; Simpson 1989). Comparatively, other scholars have adopted a position on the other end of the spectrum, specifically suggesting that our theories should be sex-neutral because the causal processes that relate to

delinquency appear to be more similar than different (Braithwaite 1989; Gottfredson and Hirschi 1990; Moffitt et al. 2001). Based on their results from an in-depth and comprehensive analysis of data from the Dunedin Birth Cohort, Moffitt et al. (2001) even went so far as to suggest that there was virtually no evidence in the data to support further theoretical postulating on if, how, and why sex differences in offending exist. Instead, Moffitt et al. (2001, p. 235) concluded that future theoretical and empirical efforts exploring the reasons for explaining crime/delinquency should adopt a more parsimonious model (e.g., sex-neutral), rather than one that incorporates the added complexity of sex.

Acknowledging these two opposing theoretical viewpoints, some scholars have opted to propose a more middle-ground approach to explaining criminality. While this approach recognizes the merit of both sex-specific and sex-neutral approaches, proponents of this approach argue that these explanations should be integrated. Specifically, these scholars contend that the underlying causal processes that lead to offending are similar across sex, yet the way in which males and females experience and react to these processes, such as peer influences, parenting techniques, socializations, bonds, etc. qualitatively differ (Broidy and Agnew 1997; Jennings et al. 2009; Piquero and Sealock 2004; Piquero et al. 2005a; Tittle et al. 2003). For instance, a number of the general theories of crime/delinquency emphasize the importance of family processes that either increase the risk for or insulate youth from crime/delinquency. A middle-ground theoretical approach to this relationship would suggest that family processes are likely to affect both males and females and contribute to their involvement/lack of involvement in crime and delinquency, however, it is quite possible to expect that the type, intensity, and complexity of parental disciplining strategies is likely to vary by sex. Furthermore, the nature of these family processes may vary by sex across different periods of the life-course (e.g., early childhood, late childhood, adolescence).

Yet, despite the accumulating body of literature and criminological theorizing focusing on girls' antisocial behavior and offending (Zahn et al. 2008), the fact still remains that the overwhelming majority of what we know about offending has been generated from research on males. Furthermore, there has been an even a greater neglect in research analyzing females' involvement in delinquency over the life-course in particular (MacDonald and Chesney-Lind, 2001; Lanctôt and Le Blanc 2002). Cernkovich et al. (2008) have even suggested that most of the prior research analyzing female delinquency has relied on small normative samples of females, and have not utilized longitudinal data. Thus, in light of these deficiencies in this area of research, this study provides a longitudinal analysis of the sex-similarities/differences in delinquency among a large, at-risk sample of male and female urban Chicago youth.

### Theoretical Framework and Prior Research

While many criminological theories exist for explaining delinquency, one particular theory that appears to be most relevant for analyzing possible sex similarities/differences in offending during adolescence is social learning theory. Akers' (1985) social learning theory is comprised of four key elements: definitions, differential association, differential reinforcement, and imitation. According to Akers' formulation, these concepts collectively emphasize the role of peers as it relates to delinquency. Specifically, peers provide definitions favorable toward violations of the law, and they also offer the context wherein the modeling and reinforcement of delinquent behavior takes place. Or stated more elaborately,

The probability that persons will engage in criminal and deviant behavior is increased and the probability of their conforming to the norm is decreased when they differentially associate with others who commit criminal behavior and espouse definitions favorable to it, are relatively more exposed in-person or symbolically to

salient criminal/deviant models, define it as desirable or justified in a situation discriminative for the behavior, and have received in the past and anticipate in the current or future situation relatively greater reward than punishment for the behavior (Akers 1998, p. 50).

A substantial number of empirical studies have since identified each of these four elements as being significant for explaining a host of criminal/delinquent activities both individually and collectively, and to varying degrees (for review, see Akers and Jennings 2009). Yet, despite this seemingly robust association between social learning and offending, much less research has specifically focused on the salience of this theoretical construct across sex. Having said this, early research by Johnson (1979) suggested that the effect of delinquent peer exposure on delinquency varied by sex, in that its influence appeared stronger for males. Similarly, Simons et al. (1980) found evidence that a large portion of the gender-gap in delinquency could be explained by the fact that males were more likely to have friends that supported delinquent behavior compared to females. In this same vein, Giordano's (1978) early work demonstrated that females who spent more time in groups with boys were more delinquent than those who only associated with girls, which suggests that girls' delinquency may be a result of their learning this behavior from male delinquent peers. Morash (1986) and Smith and Paternoster (1987) also reported that much of the sex differences in offending could be accounted for by the greater involvement among males with delinquent peer groups.

More recent research examining the salience of social learning theory variables by sex has, for the most part, revealed findings consistent with the earlier research. Specifically, Mears et al. (1998) reported that males on average were exposed to higher rates of delinquent peers; however, they also noted that moral inhibitions still had a direct effect on delinquency and its effect was stronger for females. Relying on self-report data from Seattle, Washington, Jensen (2003) was able to demonstrate that a substantial portion of the effect of sex on offending was mediated by delinquent peer associations, and these findings held across crime type (serious and non-serious). More recently, Piquero et al. (2005a) were able to identify important sex differences among high school students with regard to their delinquent involvement and the level of their delinquent peer associations. Yet, their findings more generally led them to conclude that there appeared to be more similarities than differences across sex. This latter statement in particular has been supported in cross-cultural social learning research investigating the role of sex as well (Hartjen and Priyadarsini 2003; Miller et al. 2008; Svensson 2003).

Acknowledging the empirical research directly testing social learning theory, it is important to mention that Osgood et al.'s (1996) theory of unstructured socializing may also have relevance here. Specifically, Osgood et al. suggest that an individual's likelihood for delinquency is increased in the absence of an adult authority figure's supervision. Furthermore, Osgood et al. argue that when an adolescent spends a significant amount of time without adult supervision and in the company of peers, then they will be more likely to engage in delinquency when an opportunity arises. Peers have the potential to make delinquency appealing, especially considering the fact that they can provide the opportunity to reward an adolescent's decision to engage in delinquency, as well as offering the means to make delinquency easier to perform (e.g., serve as co-offenders). In addition to the tangible rewards peers can provide, peers can also supply intangible rewards such as an increase in status or reputation.

Since its inception, several explicit tests of Osgood et al.'s theory have revealed evidence supporting the relationship between the amount of time spent in the absence of adult supervision and delinquency. For example, Osgood et al. (1996) found that unstructured socializing mediated the association between age, sex, and socioeconomic status and

offending. Similarly, Osgood and Anderson (2004) demonstrated that parental monitoring had a contextual relationship with unstructured socializing, and that unstructured socializing was significantly associated with delinquency. Most recently, Haynie and Osgood's (2005) results from the National Longitudinal Study of Adolescent Health suggested that adolescents who spend a greater amount of time with their friends and without adult supervision reported more frequent involvement in delinquency. Thus, it is apparent that unstructured socializing is associated with delinquency, and this relationship can be observed in cross-sectional and longitudinal research.

### **The Sex-Crime-Trajectories Relationship**

Although there now exists a great deal of criminological literature identifying distinct trajectories of offending (for review, see Piquero 2008), there is considerably less research examining sex-disaggregated trajectories in general (Fontaine et al. 2009) and investigating the role of delinquent peer influence as it relates to offending trajectories specifically. Acknowledging these issues, we now review several relevant studies that have estimated sex-disaggregated trajectories of offending among adolescents.

In one of the first sex-disaggregated trajectory studies focusing on offending, D'Unger et al. (2002) estimated the trajectories of offending separately for males and females who participated in the 1958 Philadelphia Birth Cohort Study. Relying on official data, their results identified five trajectories for males and three for females. Among the male trajectory groups, two groups appeared to be of particular interest. One group was a high-rate adolescent peaked group whose frequency of offending peaked during mid-adolescence before declining in late adolescence and into young adulthood. In contrast, a high-rate chronic group was identified that demonstrated stability in their frequency of offending throughout adolescence and into their mid-20s before declining. Turning toward the female trajectory groups, only two offender groups were observed, a low-rate and a high-rate adolescent peaked group. The most noteworthy finding from D'Unger et al.'s trajectory analysis was the fact that despite the relatively similar patterns (trajectories) of offending for males and females, the rates of offending were always higher among the male trajectory groups.

Piquero et al. (2005b) also relied on official data to estimate sex-disaggregated trajectory models among male and female participants in the New Zealand Birth Cohort Study. Their full sample results revealed three distinct trajectories; however, they noted that after conditioning on adolescent differences in the propensity to offend (based on the trajectories) the variation in offending in adulthood was consistent with a random (Poisson) process. Specifically, once an individual's adolescent offending propensity was accounted for, then random variation in adulthood was sufficient for explaining offending in adulthood. Furthermore, Piquero et al.'s sex-disaggregated trajectory models revealed three trajectory groups for the males (low-rate, medium-rate, and high-rate) and only two female trajectory groups (low-rate and medium-rate). Nevertheless, the pattern that emerged in the full sample analysis with regard to the conditioning of adolescent offending on adulthood criminality held for the males and females.

Most recently, Odgers et al. (2008) provided a more comprehensive sex-disaggregated trajectory analysis relying on self-, parent-, informant-, and teacher-report data among New Zealand Birth Cohort Study members up to age 32. Odgers et al.'s results suggested that the females in the high-rate, chronic trajectory were characterized by neuro-developmental deficits and familial risk, and more likely to demonstrate continuity in violent offending. Furthermore, these females also displayed poor mental and physical health at age 32. Comparatively, the females in the adolescent-limited trajectory appeared to have a relatively normal profile of risk, and exhibited very little continuity in their offending over time. Most

importantly, the patterns of offending and the risk factors associated with the female trajectory groups were, by and large, replicated among the males, which suggested that the etiological origins and offending pathways were consistent across sex. Finally, Broidy et al. (2003) analyzed sex-disaggregated trajectories based on six longitudinal studies and identified three to four trajectory groups for males and females across the studies. However, despite this consistency, Broidy et al. noted that the males demonstrated greater evidence of continuity in their problem behavior compared to females, and reported that there was no clear link between childhood behavior problems and adolescent offending among the females.

### Current Study

Despite the growing amount of criminological research and theorizing on females' antisocial behavior and offending (Zahn et al. 2008), females are still largely neglected in criminological research. Furthermore, females' involvement in crime/delinquency over the life-course and in comparison to males is even further scant (MacDonald and Chesney-Lind 2001; Lanctôt and LeBlanc 2002). Cernkovich et al. (2008) have even reported that the majority of the prior research analyzing female delinquency has relied on small normative samples of females, and have predominantly used cross-sectional data. Acknowledging these research deficiencies and recognizing that there are only a few studies examining sex-disaggregated trajectories and investigating the role of delinquent peer influence as it relates to offending trajectories specifically, this study provides a longitudinal analysis of the sex-similarities/differences in delinquency among a large, at-risk sample of male and female urban Chicago youth.

Specifically, theory and prior research suggest the following tentative hypotheses. First, the trajectories of delinquency among the male and female youth should be more similar than different with regard to the number of trajectory groups and the shape of their offending curves. Second, delinquent peers should be significantly associated with baseline delinquency and the trajectories of delinquency when estimated in a baseline model. Finally, once estimated in a more fully specified multivariate model with additional theoretically relevant control variables, the role of delinquent peers on trajectories of delinquency may likely be indirect, or in other words, its effect may operate through its relationship with baseline delinquency.

## Methods

### Data and Sample

Data were from Project Northland Chicago (PNC), a longitudinal alcohol prevention program for multi-ethnic urban youth (Komro et al. 2004; Komro et al. 2008). A cohort of youth enrolled in 61 public schools in Chicago participated in the study and completed self-report questionnaires when in 6th to 8th grade. Response rates ranged from 91% to 96% each year. Details on the research design, sample characteristics, and measures can be found elsewhere (Komro et al. 2008). Parental consent and student assent procedures were approved by the University of Minnesota's Institutional Review Board for the Protection of Human Subjects and the Chicago Public Schools' Law Department. University of Florida and University of Louisville IRBs approved conduct of secondary data analyses. A Certificate of Confidentiality was obtained from the U.S. Department of Health and Human Services to further protect the confidentiality of the student responses.

The original PNC sample included 5,766 youth (who completed surveys in 6th, 7th or 8th grade). Of these youth, 5,433 responded to the delinquency questions, including 3,038 youth who participated in the control group. The current study utilized only the control group,

which included 1,160 Black, 1,015 Hispanic, and 863 White/other youth for a total of 3,038 youth (49.4% females and 50.6% males). The majority of the youth had lived in the U.S. their entire life (84.6%), spoke English in their homes (66.5%), lived in two-parent households (55.9%), and were from low-income households (80.2% receiving free or reduced-price lunch). Youth included in this study ranged from age 12 to age 14; mean age in 6th grade ( $M=12.31$ ,  $SD=0.56$ ), 7th grade ( $M=13.26$ ;  $SD=0.49$ ), and 8th grade ( $M=14.24$ ;  $SD=0.46$ ).

## Measures

### Dependent Variable

**Delinquency:** The dependent variable was comprised of 13 items measuring a range of delinquent activities in the previous month, including alcohol use; marijuana use; damaged property; called someone a bad name to their face; told someone you were going to hit them or beat them up; pushed, shoved or pulled someone's hair or grabbed someone; kicked, hit or beat up another person; taken part in a fight; stolen something from a store; cut or skipped school; been in trouble for not following school rules; been sent to the principal's office for doing something wrong or had detention; and/or gotten into serious trouble with a parent or guardian. All of these questions had Likert-type response options, and the responses were recoded such that 0=never, 1=1–3 times, and 2=4 times or more. After coding the responses in this fashion, the youth's responses to each delinquent activity were summed in order to create the overall scale, which incorporated the elements of both offense variety and offense frequency. Overall, values on the delinquency scale ranged from 0 to 24 ( $M=5.67$ ;  $SD=4.66$ ) at baseline measurement (beginning of 6th grade), and 0 to 26 at the end of 6th grade ( $M=6.61$ ;  $SD=5.12$ ), 7th grade ( $M=7.29$ ;  $SD=5.19$ ), and 8th grade assessments ( $M=7.40$ ;  $SD=5.26$ ).

### Independent Variable

**Delinquent Peers:** This variable represented the youth's response to the number of friends that they reported drink alcohol, with the following response options: 0= none, 1=a few; 2=some; 3=many; and 4=almost all. Nearly one-third of the youth reported that they had delinquent peers ( $M=0.51$ ;  $SD=0.87$ ).

### Control Variables

**Natural Parent Household:** This variable represented the family structure in which the youth resided, where 1 indicated that the youth resided with their mother and father together (two parent natural household) and 0 represented some alternative family structure.

**Socioeconomic Status:** This dichotomous variable indicated whether or not the youth reported that they received free or reduced price lunches at school (1=yes; 0=no).

**Hispanic:** This dummy variable was coded as 1 if the youth reported that they were Latino, Hispanic, or Mexican American and 0 if the youth reported being Black or African American or White, Caucasian, or European American or other.

**Black:** This dummy variable was coded as 1 if the youth reported that they were either Black or African American and 0 if the youth reported being Latino, Hispanic, or Mexican American or White, Caucasian, or European American or other.

**Age:** This continuous variable represented the age of the youth at baseline (the beginning of 6th grade), and ranged from age 12 to age 14 ( $M=11.84$ ;  $SD=0.57$ ).

**U.S. born:** This dummy coded variable indicated whether or not the youth reported having lived in the U.S. all of their life. Youth who reported living in the U.S. all of their life were coded as 1, whereas youth who reported not having lived in the U.S. all of their life were coded as 0.

**Lack of Adult Supervision:** This variable measured the extent of monitoring that the youth reported having, specifically how many hours a day they spend without an adult around. The response options were based on a Likert-scale and were coded such that 0=none, 1=less than 1 hour, 2=1–2 hours, 3=3–4 hours, and 4=5 or more hours. Nearly three-fourths of the youth reported lacking adult supervision for some period of time during the day ( $M=1.71$ ;  $SD=1.44$ )

## Analytic Strategy

The analysis plan proceeded in several steps. First, bivariate sex differences were assessed using a series of mean difference *t*-tests. Second, sex-disaggregated trajectory models were estimated according to the procedures described below. Third, a series of one-way analysis of variances were conducted in order to examine any possible bivariate significant differences by trajectory group by sex, particularly the role of delinquent peers. Fourth, a negative binomial regression analysis was performed to determine the direct effect of delinquent peers on baseline delinquency, and a multinomial logistic regression analysis was conducted to investigate the direct effect of delinquent peers on the trajectories of delinquency by sex. Finally, a fully specified multinomial logistic regression model was estimated to examine the role of delinquent peer influence within a multivariate context to assess any possible indirect effects of delinquent peer influence.

## Results

### Mean Difference Tests

The results from the series of mean difference *t*-tests indicated that virtually none of the demographic factors including family structure (e.g., residing in a natural parent household), socioeconomic status, Hispanic, Black, and being U.S. born significantly varied by sex. The one exception was age, where the males were significantly (albeit not substantively) older than the females. Males also reported significantly less adult supervision during the day and a greater number of delinquent peers compared to the females. Finally, the levels of reported delinquency at baseline (beginning of 6th grade) as well as delinquency at the end of the 6th, 7th, and 8th grade were all significantly higher for the males (Table 1).

### Trajectory Estimations

There were four waves of delinquency data available for use from the PNC data. The first wave of data (referred to as the baseline data) was collected from the youth at the beginning of 6th grade. Each subsequent follow-up wave was gathered at the end of the 6th, 7th, and 8th grade school year, respectively. Thus, it was necessary to model the sex-disaggregated trajectories using the three follow-up waves because each of these observations were based on an equivalent time dimension between data collection (e.g., once a year for 3 years) and to better establish causality. Nevertheless, modeling the trajectories in this fashion also allowed us to include baseline delinquency as a covariate in the subsequent analyses that follow to control for baseline differences in delinquency at the same period of time when all of the other independent measures (particularly delinquent peers) were assessed.

Considering that we were modeling the sex-disaggregated trajectories using count data and relying on delinquency data gathered at three observation points, the zero-inflated Poisson (ZIP), linear model was determined to best represent the parametric and functional form of

the data. Model selection is based on an examination of the Bayesian Information Criterion (BIC), which is the log-likelihood evaluated at the maximum likelihood estimate less one-half the number of parameters in the model times the log of the sample size (Schwartz 1978). For a given model, BIC is calculated as:  $BIC = \log(L) - 0.5k \log(N)$ , where L is the value of the model's maximized likelihood, N is the sample size, and k is the number of parameters in the model, which is determined by the order of the polynomial used to model each trajectory and the number of groups (Nagin 2005). More parsimonious models are favored as a 'penalty' is added when a decision is made to complicate the model by adding another group. Model precision is gauged by posterior probabilities of group membership. As described by Nagin (2005), we made the final model selection and determination of the number of trajectory groups based on an analysis of the Bayesian Information Criteria (BIC) to maximize model fit and an examination of the mean posterior probabilities of group assignment. All of the mean posterior probabilities of group assignment for our sex-disaggregated trajectory models were relatively high and above the 0.70 cutoff offered by Nagin (2005). The results of these trajectory models are further described below.

### Sex-Disaggregated Trajectories

As can be seen, seven trajectories best represented the delinquent activity among the males (see Fig. 1). G1 represented the non-delinquent trajectory with virtually no offending at the end of the 6th, 7th, or 8th grade. G2, the least prevalent trajectory (4.2%), can be described as a low-rate increasing trajectory that begins with a very low-rate of offending at the end of 6th grade, but then doubles their rate of offending by the end of 7th grade, and nearly triples this rate by the end of 8th grade. In contrast, G3 represents a low-rate stable trajectory that begins with a low-rate of offending at the end of 6th grade, yet maintains this same rate for the next 2 years. G4 appeared to be a moderate-rate increasing trajectory, and the magnitude of the increase in offending that was observed was similar to that of G2. Specifically, G4 doubled its rate of offending from the end of 6th grade to the end of 7th grade, and again doubled its rate by the end of 8th grade. G5, the most prevalent trajectory (31.3%), resembled G3 in that it can be described as a stable trajectory, but its rate of stability is nearly twice as great as the offending rates of G3. The final two trajectory groups (G6 and G7) were fairly similar in that they both exhibited high rates of offending and increased over time, yet the rate of offending for G7 was nearly fifty percent greater than the rate of offending for G6. Taken together, the delinquent trajectories among the PNC males was either stable (G3, G5) or increasing (G2, G4, G6, G7) at varying rates over the three school years.

Similar to the male trajectory results, seven trajectories also best represented the delinquent activity of the females (see Fig. 2). Again, G1 represented the non-delinquent trajectory with virtually no offending reported at the end of the 6th, 7th, or 8th grade. G2, the least prevalent trajectory (6.1%), represented a low-rate increasing trajectory that began with a very low-rate of offending at the end of 6th grade, yet marginally increased its rate at the end of the 7th and 8th grade. G3 closely resembled G2 in that it began with a low-rate of offending and increased over the next 2 years, although G3's increased rate of offending was more pronounced than G2's and the mean rates of G3 were nearly double that of G2. G4 and G5 are alike because they both decreased at a similar rate, but G5's mean rate of offending was almost twice as large as G4's rate at the end of 6th, 7th, and 8th grade. G6, the most prevalent trajectory (30.5%), represented a high-rate increasing trajectory and its trend resembled that of G2 and G3. Finally, G7 was the only trajectory group that appeared stable for the females (with the exception of G1 whose non-offending was stable), however this trajectory also displayed the highest rate of offending at each time period. These trajectory results indicated that the delinquent activity among the PNC females was increasing for the



most part (G2, G3, G6), declining for some (G4, G5), and remaining high and stable for others (G7).

### **Delinquent Peers and Its Association with Trajectory Group Membership**

The results of the series of one-way analysis of variance tests are presented in Table 2. In general, nearly all of the variables were significantly associated with trajectory group membership, and these results were largely consistent across sex (with the exception of socioeconomic status and U.S. born for the male trajectories and socioeconomic status for the female trajectories). More specifically, there appeared to be a significantly greater concentration of natural parent households and Hispanics in the non-delinquent and lower-rate male and female trajectories, and, in contrast, a greater concentration of Blacks and individuals who spent greater amounts of time absent adult supervision in the low, moderate, and higher rate trajectories than in the non-delinquent male and female trajectories. With regard to the main focus of this study, the role of delinquent peers was also significantly associated with trajectory group membership for males and females. Additional Tukey's *b* post hoc tests revealed that while delinquent peers did not significantly discriminate the lower-rate trajectories from the non-delinquent trajectories, it appeared significant and rather salient for discriminating the higher-rate trajectories (e.g., G6 and G7 for the males; and G5, G6, and G7 for the females) from the lower-rate and non-delinquent trajectories. Finally, as expected, baseline delinquency measured at the beginning of 6th grade was significantly associated with male and female trajectory group membership.

### **The Role of Delinquent Peers in Distinguishing Trajectory Group Membership**

Although the previous analysis suggested that the number of delinquent peers played a significant role for discriminating the male and female trajectories, it was important to further examine this relationship within a multivariate context. Due to the clustered nature of the PNC data (e.g., youth within schools), it was necessary to adjust the standard errors to reduce the bias in the estimates. This adjustment was performed using the clustered robust standard errors feature available in Stata 10.0. According to the negative binomial regression results presented in Table 3 (Model 1), there was a positive and statistically significant relationship between associating with delinquent peers and baseline delinquency, and this effect was observed for males and females. Furthermore, the results from the baseline multinomial logistic regression model (with the non-delinquent trajectory serving as the reference group) demonstrated that delinquent peers significantly distinguished nearly all of the trajectories from the non-delinquent trajectory (with the exception of G2 for the males and G2 and G3 for the females), and these results were consistent across sex (Model 2).

Considering the regression results reported above, it was important to further examine whether or not the role of delinquent peers still maintained its direct effect after controlling for baseline differences in delinquency. The results obtained from this more fully specified model suggested that after controlling for baseline delinquency along with natural parent household, socioeconomic status, Hispanic, Black, age, U.S. born, and a lack of adult supervision, delinquent peers still maintained a positive association with trajectory group membership (with the exception of G2 for both males and females), yet the associations were no longer significant (see Table 3). This evidence indicated that the role of delinquent peers on distinguishing trajectory group membership in a more fully specified model appeared to be indirect (operating through its effect on baseline delinquency). In addition, residing in a natural parent household significantly decreased an individual's likelihood of being assigned to a delinquent male trajectory (G2, G3, or G6). Comparatively, being older and spending greater amounts of time without adult supervision were significant at times for increasing an individual's likelihood for being assigned to a delinquent trajectory group (Table 4).

## Discussion

This study sought out to provide a longitudinal analysis of sex-disaggregated trajectories of delinquency among a large, at-risk sample of male and female urban Chicago youth, with a particular focus on the role of delinquent peers as it relates to offending trajectories. Several important findings were generated from this effort, and they are further elaborated on below.

Consistent with the majority of the prior trajectory-based research in general (Piquero 2008) and the prior sex-disaggregated trajectory studies focusing on adolescents (Fontaine et al. 2009), the trajectory results estimated here revealed a similar number of trajectories for both males and females. More specifically, seven trajectory groups were identified, and the trajectories can be largely categorized as non-delinquent (G1 for males and females), increasing (G2, G4, G6, G7 for the males; G2, G3, G6 for the females), or stable (G3 and G5 for the males; G7 for the females) with varying rates of offending. In addition, two of the female trajectory groups appeared to show evidence of a decline in their offending rates (G4 and G5), whereas none of the male trajectories demonstrated this pattern of decline. Furthermore, it is also worth noting that the two female trajectories that appeared to decline only represented approximately twenty percent of the females. Therefore, the trajectory results suggested that virtually all of the PNC males who were assigned to any of the delinquent trajectories were either maintaining their rates of offending or increasing their offending by the end of the 7th and 8th grade school year. With the exception of the two female trajectory groups (G4 and G5), this statement is also true for the PNC females.

With regard to the role of delinquent peers as it relates to offending trajectories, the bivariate associations provided from the series of one-way analysis of variance tests indicated that the number of delinquent peers that the youth reported associating with was significantly related to trajectory group membership. The next stage of the analysis demonstrated that delinquent peers had a positive and significant relationship with baseline delinquency, and significantly distinguished the moderate-rate and high-rate trajectory groups from the non-delinquent trajectory. These findings were consistent across sex. However, once this relationship was further evaluated in a multivariate context and controlling for baseline differences in delinquency, the effect of delinquent peers remained positive (for the most part), yet no longer significant. The results from this fully specified model suggested that the role of delinquent peers in distinguishing trajectory groups appeared to be indirect, e.g., operating through its effect on baseline delinquency. In addition, residing in a natural parent household, being older, and spending greater amounts of time without adult supervision were also significant at times for affecting an individual's likelihood for being assigned to a delinquent trajectory group.

Having said this, these results should be considered in light of several limitations. First, this study examined how delinquent peers at baseline along with other baseline measures were able to significantly distinguish the offending trajectories. Therefore, while we were able to assess the relative influence of delinquent peers and other baseline measures on affecting an individual's likelihood of being assigned to one particular trajectory as opposed to another, we were not able to examine possible changes over time in the role of delinquent peer influence and how changes in delinquent peer influence over time may also affect changes in offending over time. We encourage future research to look at the possible dynamic nature of the relationship between delinquent peer influence and trajectories of offending. Second, considering that our trajectory analysis relied on self-report data, future studies should make an effort to estimate sex-disaggregated trajectories among similarly aged youth (e.g., 6th to 8th grade) using official data. Finally, while our analysis was longitudinal and involved an at-risk sample of youth, it was still confined to one developmental period in the life-course (e.g., mid-adolescence). It would be important for future research to further examine the sex-

disaggregated trajectories and the role of delinquent peers as it pertains to trajectories of offending in other developmental life-course stages as well, such as early childhood, late adolescence, young adulthood, etc.

Acknowledging the consistency of the results demonstrated here with the previous sex-disaggregated research focusing on social learning theory (for review, see Piquero et al. 2005a), the findings largely suggest that males and females appear to be rather similar in their offending trajectories and associating with delinquent peers elevates a male's and a female's risk for moderate-rate and high-rate offending. The only noticeable difference among males and females was that males had higher rates of delinquency and a greater number of delinquent peers. Thus, while the levels of offending and delinquent peer associations vary by sex, the process of how delinquent peers affect trajectories of offending appears to be the same. This evidence suggests that perhaps a more parsimonious theoretical model that forgoes sex-specific pathways (Moffitt et al. 2001), yet still acknowledges the variation in the degree to which certain factors are experienced at different levels by males and females may be most appropriate.

### Policy Implications and Conclusions

Turning toward the broader policy implications, it is well known that many of the early delinquency prevention programs were not grounded upon any specific theoretical framework or "evidence-based" approaches (Catalano et al. 1998). This was unfortunate because criminological theories often have policy prescriptions and implications, and criminal justice programming and practice is inherently based on some type of explanation or assumption about human behavior (even if not explicitly referenced) (Akers and Sellers 2009). Prior research has recognized the applicability of social learning theory to policy and practice, particularly for prevention, treatment, and rehabilitation programs (Andrews and Bonta 2003; Cullen et al. 2003). Specifically, it has been argued that applied programs and procedures that are able to re-orient or change a youth's definitions/attitudes and delinquent peer associations can be expected to provide some degree of crime/delinquency reduction benefit. Several examples of these programs more generally include: group-based cognitive therapies and self-help programs, peer programs, gang interventions, family and school programs, teenage drug, alcohol, and delinquency prevention/education programs, and other private and public programs in correctional, treatment, and community facilities (Akers and Jennings 2009). In addition, Akers and Sellers (2009) have reported that while large effect sizes are generally rare in evaluations of any specific policy or program targeting delinquency, a considerable amount of research has demonstrated that prevention and treatment programs focusing on juveniles and adults based on social learning principles often have significant and measureable effects on reducing crime and delinquency. Furthermore, these effects are often greater than those observed in programs that follow alternative theoretical principles (see Botvin et al. 1995; Ellis and Sowers 2001; Pearson et al. 2002; Andrews and Bonta 2003; Cullen et al. 2003; Triplett and Payne 2004; Landenberger and Lipsey 2005; Gendreau and Smith 2006).

Thus, while recent scholarship has certainly advanced the knowledge base on female-specific pathways of offending and highlighted the importance of key factors that influence females' delinquent behavior (Zahn et al. 2008), the fact still remains that many of these pathways and factors are shared with males, to varying degrees (Belknap and Holsinger 2006; Dembo et al. 1992; Dodge et al. 1990). Therefore, early interventions targeting adolescent delinquency (specifically high-rate delinquency) that are focused on the principles of social learning theory are likely to be effective and offer some degree of a cost-benefit compared to the costs of incarceration. In this same vein, considering the sex similarities in offending trajectories and the role of delinquent peers, it is logical to assume that effective and evidence-based female interventions are likely to be just as beneficial to

males as effective and evidence-based male interventions are to females. Ultimately, we hope that this study has taken another important step forward in further unpacking the relationship between delinquent peers and sex-disaggregated patterns of offending. Overall, the results suggest that there appears to be more similarities than differences between males and females, and this finding has implications for criminological theory and criminal justice policy and programming.

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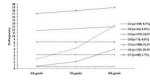
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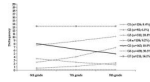
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**Fig. 1.**  
Males: Trajectories of Delinquency ( $n=1,538$ )





**Fig. 2.**  
Females: Trajectories of Delinquency ( $n=1,500$ )

**Table 1**

Sex similarities/differences

Variables	Males			Females				
	Mean	SD	Minimum	Maximum	Mean	SD	Minimum	Maximum
Natural Parent Household	0.56	-	0.00	1.00	0.56	-	0.00	1.00
Socioeconomic Status	0.78	-	0.00	1.00	0.82	-	0.00	1.00
Hispanic	0.33	-	0.00	1.00	0.34	-	0.00	1.00
Black	0.37	-	0.00	1.00	0.40	-	0.00	1.00
Age***	11.90	0.59	10.43	14.2	11.77	0.55	10.34	14.34
U.S. born	0.84	-	0.00	1.00	0.85	-	0.00	1.00
Lack of Adult Supervision***	1.91	1.44	0.00	4.00	1.51	1.41	0.00	4.00
Delinquent Peers***	0.55	0.92	0.00	4.00	0.44	0.82	0.00	4.00
Delinquency (Baseline)***	6.44	4.84	0.00	24.00	4.87	4.30	0.00	23.00
Delinquency (6th grade)***	7.32	5.35	0.00	26.00	5.88	4.74	0.00	25.00
Delinquency (7th grade)***	7.82	5.36	0.00	26.00	6.73	4.95	0.00	23.00
Delinquency (8th grade)***	8.10	5.55	0.00	26.00	6.70	4.86	0.00	24.00

\* $p < .05$

\*\* $p < .01$

Asterisks denote significant sex differences

\*\*\* $p < .001$

**Table 2**

ANOVA results and group mean covariate levels by sex

<i>Variables by Trajectory Group</i>	G1	G2	G3	G4	G5	G6	G7	<i>f test</i>
<b>Males</b>								
Natural Parent Household	0.77	0.56	0.60	0.61	0.56	0.45	0.49	5.32***
Socioeconomic Status	0.79	0.66	0.79	0.81	0.77	0.81	0.80	0.96
Hispanic	0.42	0.38	0.38	0.38	0.32	0.24	0.28	4.01***
Black	0.22	0.28	0.32	0.28	0.40	0.50	0.45	10.54***
Age	11.79	11.81	11.78	11.89	11.90	12.03	12.10	5.84***
U.S. born	0.83	0.86	0.85	0.80	0.81	0.87	0.88	0.84
Lack of Adult Supervision	1.34	1.63	1.80	1.96	2.00	2.06	2.32	4.63***
Delinquent Peers	0.15	0.16	0.29	0.52	0.55	0.91	1.25	22.58***
Delinquency (Baseline)	1.79	2.54	4.28	5.02	6.87	9.55	11.25	92.61***
Delinquency (6th grade)	0.57	0.52	4.10	2.23	8.06	12.44	18.15	735.82***
Delinquency (7th grade)	0.67	1.92	4.26	6.96	8.54	13.25	19.61	621.32***
Delinquency (8th grade)	0.60	6.40	3.69	13.51	7.98	13.44	19.66	597.51***
<b>Females</b>								
Natural Parent Household	0.74	0.76	0.57	0.68	0.55	0.50	0.42	7.74***
Socioeconomic Status	0.79	0.86	0.80	0.83	0.79	0.83	0.83	0.39
Hispanic	0.46	0.47	0.44	0.47	0.29	0.25	0.20	13.35***
Black	0.13	0.10	0.34	0.21	0.42	0.53	0.57	29.53***
Age	11.56	11.72	11.75	11.65	11.72	11.84	11.92	5.54***
U.S. born	0.69	0.74	0.80	0.81	0.86	0.92	0.91	7.41***
Lack of Adult Supervision	1.10	1.24	1.44	1.33	1.33	1.42	1.48	3.34***
Delinquent Peers	0.07	0.07	0.21	0.25	0.55	0.61	0.81	18.53***
Delinquency (Baseline)	0.76	1.15	2.60	3.19	5.96	6.09	9.42	109.05***
Delinquency (6th grade)	0.11	0.43	2.18	3.50	8.17	7.38	13.62	732.49***
Delinquency (7th grade)	0.08	1.34	4.46	2.74	6.54	9.48	14.77	537.51***

<i>Variables by Trajectory Group</i>	G1	G2	G3	G4	G5	G6	G7	<i>f test</i>
Delinquency (8th grade)	0.16	2.26	6.81	1.40	4.14	10.00	13.72	536.87***

+  $p < .10$

\*  $p < .05$

\*\*  $p < .01$

\*\*\*

$p < .0001$

**Table 3**  
Effect of delinquent peers on baseline delinquency and trajectories of delinquency by sex

Regression Models	Males			Females		
	b	Robust se	exp (B)	b	Robust se	exp (B)
<i>Baseline Delinquency (Model 1)</i>						
Delinquent Peers	0.32***	0.02	1.38	0.38***	0.04	1.46
<i>Trajectories of Delinquency (Model 2)</i>						
Delinquent Peers						
G1	—	—	—	—	—	—
G2	0.08	0.39	1.08	0.03	0.75	1.03
G3	0.62**	0.25	1.86	0.96	0.55	2.62
G4	1.10***	0.27	3.00	1.12*	0.59	3.05
G5	1.15***	0.24	3.15	1.75***	0.55	5.73
G6	1.51***	0.22	4.51	1.82***	0.55	6.16
G7	1.73***	0.25	5.62	2.02***	0.53	7.51

\*  $p < .05$   
 \*\*  $p < .01$   
 \*\*\*  $p < .001$

**Table 4**

Multinomial logistic regression results by sex

Variables	Males			Females		
	G#	b	Robust se exp (B)	G#	b	Robust se exp (B)
Natural Parent Household	G1	-	-	G1	-	-
	G2	-0.81*	0.42	G2	0.09	0.47
	G3	-0.50*	0.26	G3	-0.50	0.36
	G4	-0.51	0.48	G4	-0.21	0.40
	G5	-0.50	0.31	G5	-0.39	0.36
	G6	-0.67*	0.32	G6	-0.35	0.35
	G7	-0.42	0.45	G7	-0.26	0.34
Socioeconomic Status	G1	-	-	G1	-	0.27
	G2	-0.75*	0.32	G2	0.70**	0.28
	G3	0.11	0.31	G3	0.08	0.49
	G4	0.13	0.50	G4	0.38	0.43
	G5	-0.11	0.27	G5	0.17	0.37
	G6	0.03	0.29	G6	0.31	0.48
	G7	-0.13	0.36	G7	0.39	0.48
Hispanic	G1	-	-	G1	-	-
	G2	0.02	0.51	G2	-0.69	0.39
	G3	-0.31	0.36	G3	-0.11	0.45
	G4	0.06	0.37	G4	-0.03	0.45
	G5	-0.03	0.42	G5	-0.71	0.57
	G6	-0.22	0.44	G6	-0.34	0.59
	G7	-0.56	0.65	G7	-0.63	0.62
Black	G1	-	-	G1	-	-
	G2	0.18	0.49	G2	-0.84	0.71
	G3	-0.10	0.44	G3	0.82	0.62
	G4	0.47	0.61	G4	-0.13	0.56
	G5	0.62	0.52	G5	0.45	0.66
	G6	0.80	0.62	G6	1.09	0.69
			G7		2.23	
			G7		2.96	

Variables	Males			Females				
	G#	b	Robust se exp (B)	G#	b	Robust se exp (B)		
Age	G7	0.36	0.79	1.43	G7	0.95	0.72	2.58
	G1	-	-	-	G1	-	0.31	-
	G2	0.09	0.30	1.10	G2	0.91***	0.30	2.49
	G3	-0.07	0.24	0.93	G3	0.95***	0.32	2.58
	G4	0.25	0.30	1.28	G4	0.47	0.34	1.59
	G5	0.28	0.26	1.33	G5	0.82**	0.33	2.26
	G6	0.40	0.32	1.50	G6	1.21***	0.34	3.37
U.S. born	G7	0.61*	0.28	1.83	G7	1.40***	-	4.07
	G1	-	-	-	G1	-	-	-
	G2	0.38	0.51	1.46	G2	0.52	0.36	1.69
	G3	0.31	0.31	1.36	G3	0.10	0.30	1.10
	G4	-0.09	0.42	0.92	G4	0.35	0.25	1.42
	G5	0.06	0.26	1.07	G5	0.27	0.36	1.31
	G6	0.23	0.33	1.26	G6	0.72	0.39	2.06
Lack of Adult Supervision	G7	0.31	0.54	1.37	G7	0.54	0.49	1.72
	G1	-	-	-	G1	-	-	-
	G2	0.13	0.16	1.14	G2	0.06	0.13	1.06
	G3	0.14	0.12	1.19	G3	0.11	0.11	1.12
	G4	0.24	0.19	1.27	G4	0.12	0.12	1.12
	G5	0.20	0.12	1.23	G5	-0.02	0.13	0.98
	G6	0.10	0.14	1.11	G6	0.14	0.11	1.15
Delinquent Peers	G7	0.16	0.17	1.17	G7	0.25*	0.12	1.29
	G1	-	-	-	G1	-	-	-
	G2	-0.02	0.54	0.98	G2	-0.15	0.72	0.86
	G3	0.18	0.29	1.19	G3	0.47	0.56	1.60
	G4	0.27	0.33	1.31	G4	0.42	0.59	1.53
	G5	0.29	0.32	1.34	G5	0.88	0.59	2.42
	G6	0.43	0.30	1.54	G6	0.92	0.59	2.50
G7	0.47	0.32	1.60	G7	0.79	0.57	2.20	

Variables	Males				Females			
	G#	b	Robust se	exp (B)	G#	b	Robust se	exp (B)
	Delinquency (Baseline)	G1	–	–	–	G1	–	–
	G2	0.11	0.10	1.11	G2	0.23	0.18	1.26
	G3	0.29***	0.07	1.34	G3	0.57***	0.17	1.77
	G4	0.35***	0.10	1.41	G4	0.69***	0.17	1.98
	G5	0.45***	0.08	1.57	G5	0.87***		2.38
	G6	0.60***	0.08	1.50	G6	0.87***	0.16	2.38
	G7	0.70***	0.09	1.83	G7	1.07***	0.16	2.91

\*  $p < .05$

\*\*  $p < .01$

\*\*\*  $p < .001$