Trajectories of Violent Offending and Risk Status in Adolescence and Early Adulthood

Executive Summary

Purpose

This study investigated violent offending in adolescence and early adulthood with an aim of building practical knowledge to guide prevention programs and policies. The study examined risk factors that influence violent offending and described how offending and risk levels change over adolescence and into early adulthood. Specifically, the study used longitudinal data from Waves I to VII of the National Youth Survey (Elliott, Huizinga, & Ageton, 1985; Elliott, Huizinga, & Menard, 1989) to (a) fit models that identify distinct developmental trajectories of violent offending over time, (b) fit models that identify distinct trajectories of risk levels over time, and (c) fit dual trajectory models of risk and offending (Jones, Nagin, & Roeder, 2001; Nagin, 1999; Nagin & Tremblay, 2001). These analyses shed light on the influence of risk levels on maintenance of, and desistance from, offending, and on the importance of the timing of exposure to particular risk factors (Dodge & Pettit, 2003; National Research Council and Institute of Medicine [NRC/IOM], 2001). Trajectory models using data on sample subgroups highlight similarities and differences in the trajectories of violent offending and risk levels by race and gender. Recent empirical and conceptual literature on violent offending and aggression guide the interpretation of results, with an emphasis on informing effective prevention efforts (Broidy et al., 2003; Catalano & Hawkins, 1996; Hawkins et al. 2003; Dodge & Pettit, 2003; McDermott & Nagin, 2001; NRC/IOM, 2001).

Measures

We included in our analyses measures of age at each wave, sex, and race/ethnicity. Self-reported violent offending at each wave was measured by creating an index comprising items

asking about the number of times in the past year a respondent had performed behaviors that reflected the real or threatened use of physical aggression. Due to the positive skew of offending, a dichotomous measure was created for each wave, using the 90th percentile as the cutoff. We included two fixed risk factors measured at Wave I: low household socioeconomic status (SES; Hollingshead, 1975) and parent beliefs legitimizing aggression (PBLA). We examined three time-varying risk factors measured at Waves I to VII. Youths' *beliefs legitimizing aggression* (BLA) was measured by averaging responses to two items pertaining to the extent to which a respondent agreed that it is necessary (a) to beat up someone to gain peers' respect and (b) to play dirty in order to win. *Bonding with delinquent peers* (BDP) was calculated as the product of a peer involvement score and a delinquent peers deviation score, based on the work of Elliott and colleagues (1985). We measured *involvement in conventional activities* (ICA) as the average of the standardized Family, School, and Community Involvement Scales described by Elliott and colleagues (1985), in Waves I to III, combined with a standardized aggregate measure of employment in Waves IV to VII. The measure of ICA was coded so that higher scores reflected higher levels of risk (i.e., lack of involvement in conventional activities).

Analyses.

The SAS procedure TRAJ was used to fit models identifying the optimal number and shapes of violent offending trajectories over adolescence and early adulthood as well as models to identify distinct trajectories of time-varying risk factors (Jones, Nagin, & Roeder, 2001; Nagin, 1999). Trajectory group profiles were examined using descriptive and bivariate statistics. Based on results of single trajectory models, we fit dual trajectory models of offending and risk level. Finally, single trajectory models of offending and risk were fit for demographic subgroups defined by respondents' race/ethnicity and sex.

Findings

Observations with full data on violent offending at each wave were included in all analyses, yielding a final sample of size $n = 1227$ (i.e., 71% of the original Wave I sample). Results of a logistic regression model indicated that males (OR = 1.8, $p < .01$), older youths (OR = 1.1 for each year increase in age at Wave I, $p < .05$), lower SES youths (OR = 1.1 for each 10-point increase on the SES measure, $p < .05$), and youths classified as low risk on BDP (dichotomized at the 90th percentile for this analysis only, OR = 1.6, $p = .05$) were more likely to be excluded from the final sample. Race/ethnicity was marginally significant, with youths of color more likely to be excluded from the final sample (OR = 1.3, $p = .07$).

With respect to violent offending, the best model identified five distinct trajectories: low/stable (67.6%), adolescent onset (11.9%), young adult onset (11.8%), early onset/chronic (5.3%), and early onset/desister (3.4%). Of note, offending in the early onset/chronic group persisted into early adulthood, and the young adult onset and desister groups did not correspond to offending patterns predicted by developmental criminological theory. Additionally, violent offending persisted into young adulthood for the adolescent onset group, although the trajectory for this group was decreasing after age 18. Further analysis indicated that being male was the most consistent risk factor for membership in a trajectory group for which the probability of classification as a violent offender was high, relative to the largest and normative low/stable group. Risk associated with beliefs legitimizing aggression (BLA) and bonding with delinquent peers (BDP), measured at baseline, were predictive of membership in these trajectory groups as well. Other risk measures, as well as other demographic measures, were less consistently related to offending trajectory group membership.

Seven distinct trajectories of BLA risk were identified. Risk decreased consistently over time in all but two groups, and higher levels of risk corresponded to higher average violent offending levels across the waves. BLA risk trajectories accounted for a significant proportion of the variance in offending at each wave, and this effect was largest in the earlier waves. BLA groups with higher levels of risk included higher proportions of males, and white youths were more likely to be members of groups with lower levels of BLA risk. Change over time in the level of BDP risk followed seven distinct trajectories. The three largest groups evidenced a somewhat similar pattern of relatively low (or moderate) and stable risk over time. Risk was initially low for two groups, increased for a time, and subsequently decreased, with the timing of these changes distinguishing the two groups. Risk was initially high in two small groups; it decreased steadily in one of these and remained fairly high, with some change over time, in the other. Males were somewhat over-represented in groups with higher levels of BDP risk, but no pattern emerged with respect to other demographics. Of note, absolute risk levels, as well as change in risk over time, appeared to correspond to offending levels. BDP trajectory group membership accounted for a significant and substantial proportion of the variance in offending at each wave, but this effect decreased in the later waves. Trajectory models revealed seven distinct patterns of ICA risk over time, but ICA risk levels did not appear to be associated with offending levels in the sample. Of note, several groups where ICA risk was high during at least part of the study period were predominantly female.

Dual trajectory models (Nagin & Tremblay, 2001) for offending and BLA risk, offending and BDP risk, and offending and ICA risk, were fit using the TRAJ procedure in the SAS system software (Jones et al., 2001). Results of the dual trajectory model suggested three conclusions about the relationship between BLA risk and violent offending over time. First, low and

moderate levels of BLA risk were associated with low levels of offending during early adolescence, but BLA risk did not distinguish early onset desisters from early onset chronics. Second, relatively high levels of BLA risk were accompanied by a greater probability of being classified as a violent offender. Finally, any protective effect of low and moderate levels of BLA risk appeared to be less important in later adolescence and young adulthood. Results of the dual model of offending with BDP risk suggested several conclusions. First, low – but not necessarily moderate – levels of BDP risk were accompanied by a lower level of violent offending. Second, there was no evidence that a decrease in BDP risk over time contributed to desistance for early onset offenders. Third, BDP risk levels appeared to be unrelated to the onset of offending in young adulthood, and, perhaps more tentatively, in adolescence. The dual model of offending with ICA risk suggested a lack of a relationship between the two variables, a finding consistent with earlier results.

To gain greater insight into offending, risk, and relationships between offending and risk, we completed a series of trajectory analyses for four sample subgroups: African American females (n = 76), African American males (n = 94), white females (n = 509), and white males (n = 488). For each demographic subsample and within each risk domain, we explored the relationship between offending and risk trajectories using analysis of variance models, with the score on the original violent offending measure as the outcome variable and risk trajectory subgroup as the predictor. Exploratory analyses using the very small subsample (n = 76) of African American females indicated that patterns of offending over time for the group resembled those found for the overall sample of youths. However, the best model identified only two trajectory groups, a low/stable group (84.6%) and an adolescent onset group (15.4%), compared to five distinct groups for the full sample. In a similar fashion, risk models identified fewer – but

similarly shaped – trajectories that depicted change in risk levels over time for the group. There was evidence that the risk factor, beliefs legitimizing aggression, was positively associated with offending for African American females, and that this association persisted until Wave VI (but not Wave VII). Results suggested that trajectories of risk and offending for African American males resembled two groups – a low/stable group (67.0%) and an adolescent onset group (33.0%) – found in the full sample. However, offending continued at a stable level in the second group during later waves whereas it was decreasing by this time in the full sample model. In contrast to the results for African American females, there was no evidence of an association between BLA risk and offending for African American males. Instead, there was evidence of an association between BDP risk and offending for this group. Similar to their female counterparts, there was no evidence of a relationship between ICA risk and offending for African American males. The best model identified three distinct trajectories of violent offending for white females, and these corresponded to the low/stable (81.1%), adolescent onset (9.6%), and young adult onset trajectories (9.2%) found in the full sample. There was no evidence of early onset offending trajectories for this subgroup. Analyses suggested that risk trajectories related to beliefs legitimizing aggression, and even more so, bonding with delinquent peers, were related to higher probabilities of being classified as a violent offender for white females. Risk related to lack of involvement in conventional activities was not associated with offending for this group. Three offending trajectories, low/stable (70.1%), adolescent onset (19.3%), and early onset/chronic (10.0%), were identified using data on 488 white males from the NYS sample. In contrast to the full-model sample, there was no evidence of early onset/desister and young adult onset groups for white males. Risk levels on bonding with delinquent peers and beliefs legitimizing aggression appeared to be positively associated with violent offending levels, and

changes in risk often paralleled changes in offending. There was little evidence of an association between offending and risk resulting from lack of involvement in conventional activities for white males.

Implications for Prevention Programs

Results of the current study provide information about risk processes and their association with violent offending over time. This information can, in turn, guide the development of more specific assessment procedures and more precisely targeted interventions aimed at preventing violence. Our findings showed that risk levels do not remain fixed over time. Risk related to beliefs legitimizing aggression, bonding with delinquent peers, and lack of involvement in conventional activities followed distinct patterns of change over time for different subgroups of youths, both in the population as a whole and in population subgroups defined by race/ethnicity and sex. Estimated risk trajectory group membership, based on trajectory model results, was related to violent offending for two of these risk domains, BLA and BDP. Better understanding of the nature of these complex relationships can lead to better procedures for assessing risk and planning interventions.

We found that BLA risk declined over time in the NYS sample as a whole, but trajectory models revealed distinct patterns of change over time in BLA for subgroups of youths. Patterns of BLA risk change were related to violent offending, but this relationship was stronger in earlier waves of the NYS relative to later waves, suggesting that BLA risk operates as a less salient risk factor for older adolescents and young adults. Our results indicated that the relationship between BLA risk and violent offending was positive but nonlinear. This implies a need, first, for additional research aimed at identifying a threshold level at which BLA risk becomes salient as a risk factor for aggression and violence. It also implies a need to develop and test measures of

assessing BLA risk that are sufficiently sensitive for identifying youths who may be truly at risk due to BLA. This is may be especially critical for young adolescents, given our finding that BLA risk level distinguished adolescent onset youths from low/stable offending youths in the dual trajectory model. In contrast, BLA risk level did not distinguish desisters from chronics among early onset violent offenders. Nor did it seem to contribute greatly to the onset of offending in young adulthood.

Together, these results have implications for targeting interventions aimed at preventing violence by reducing BLA. It may be that BLA reduction strategies represent a promising primary prevention strategy in interventions that target the general population of youth, especially children and young adolescents. A focus on reducing BLA may be less effective in primary prevention for older adolescents and in secondary (or tertiary) prevention aimed at youths who display problematic levels of aggression and violence in early adolescence. At the least, our findings suggest that a sole focus on reducing BLA in early onset youths will not be sufficient.

Risk pertaining to bonding with delinquent peers (BDP) appeared to increase for certain trajectory subgroups relatively later in adolescence, compared to other risk domains. Further, this risk domain was most consistently related to offending in the full sample and in three of four demographic subgroups. This suggests that assessment of this risk factor in childhood or very early adolescence may fail to identify youths who will be at later risk of developing strong and problematic relationships with delinquent peers. In contrast to the findings with respect to BLA risk, there was no evidence that the relationship between BDP risk and offending was nonlinear. Findings related to this risk domain also underscore a need to focus prevention efforts on diluting

the influence of delinquent peers across the entire span of adolescence, and if possible, into early adulthood.

Limitations

A key limitation of the current study involves the fact that these data were collected from 1977 to 1988. Thus, results do not necessarily generalize to contemporary youths and young adults. The measure of violent offending used in the trajectory analyses, although based on prior research using NYS data, was highly skewed. This led us to dichotomize the measure as described, which altered the nature of the information depicted in trajectory graphs. The sample demographics permitted analyses by important demographic subgroups, but the resulting sizes of the African American subsamples were small, and results of these analyses must be considered highly exploratory. Additionally, the NYS data did not include sufficient numbers of youths from other racial and ethnic backgrounds to permit detailed analyses of these subgroups. Missing data, especially in later waves of the NYS study, reduced the size of our analysis sample, resulting in differences between the profiles of our sample and the original sample; these sample aberrations should be kept in mind when interpreting results. Finally, NYS data did not include information on a broad array of biological and family factors that have been identified as important risk factors for aggression in recent literature.

Project Description

Purpose

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to VII of the National Youth Survey (Elliott, Huizinga, & Ageton, 1985; Elliott, Huizinga, & Menard, 1989) to (a) fit models that identify distinct developmental trajectories of violent offending over time, (b) fit models that identify distinct trajectories of risk levels over time, and (c) fit dual trajectory models of risk and offending (Jones, Nagin, & Roeder, 2001; Nagin, 1999; Nagin & Tremblay, 2001). These analyses shed light on the influence of risk levels on maintenance of, and desistance from, offending, and on the importance of the timing of exposure to particular risk factors (Dodge & Pettit, 2003; National Research Council and Institute of Medicine [NRC/IOM], 2001). Trajectory models using data on sample subgroups highlight similarities and differences in the trajectories of violent offending and risk levels by race and gender. Recent empirical and conceptual literature on violent offending guide the interpretation of results, with an emphasis on informing effective prevention efforts (Broidy et al., 2003; Catalano & Hawkins, 1996; Hawkins et al. 2003; Dodge & Pettit, 2003; McDermott & Nagin, 2001; NRC/IOM, 2001)

Conceptual Framework

Increases in the level and severity of youth violence in the 1980s and 1990s prompted a wealth of research by scholars in cognitive and developmental psychology, criminology, medicine, public health, and other fields aimed at building knowledge of its nature and etiology. This research has produced an extensive body of conceptual and empirical literature on the onset and course of violence and related problems in childhood and adolescence and on prevention policies and programs (e.g., Catalano & Hawkins, 1996; Crick & Dodge, 1994; Dishion & Bullock, 2002; Dishion, McCord, & Poulin, 1999; Dodge, 2002; Gottfredson, 2001; Hawkins et al., 2003; Henggeler, Schoenwald, Rowland, & Cunningham, 2002; Kazdin, 2002; Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998; Metropolitan Area Child Study

Research Group; 2002; National Institute of Mental Health [NIMH], 1998; NRC/IOM, 2001; Pettit & Dodge, 2003; Prothrow-Stith, 1995; Sampson, Raudenbush, & Earls, 1997; Rutter, 2003; Snyder, Espiritu, Huizinga, Loeber, & Petechuk, 2003; U. S. Public Health Service, 2001; Wasserman et al., 2003).

An ecological developmental framework for understanding and preventing a range of related problems, including violent offending, school failure, and serious emotional disturbance, has emerged from this research (e.g., Dodge & Pettit, 2003). The framework identifies biopsychosocial risk factors that have been empirically linked to problems. It draws on theories such as social learning, information-processing, labeling, and social disorganization to postulate processes through which risk factors are thought to influence the onset and course of problems.

According to the framework, certain biological and environmental factors predispose some infants to an increased likelihood of early aggressive behavior. Across childhood and adolescence, individual, family, school, peer, neighborhood, and sociocultural risk factors interact, resulting in *risk processes* that launch some children onto a developmental trajectory characterized by increased and, ultimately, chronic use of aggressive behavior (Dodge & Pettit, 2003). Reliance on aggression to solve social problems has adverse consequences on a child's behavior and development at home and school, with peers, and in the neighborhood and community. Violent and nonviolent offending, school failure, mental health disorders (e.g., conduct disorder, depression) and other problems in adolescence and beyond are likely results.

The framework highlights the importance of the timing of exposure to particular risk factors (e.g., perinatal exposure to toxins, harsh parenting in early childhood, peer rejection in elementary school, lack of monitoring by adults and involvement with deviant peers in adolescence). It proposes that cognitive structures and mechanisms for processing social

information (e.g., beliefs about the legitimacy of aggression) function as key mediators of the effects of distal risk factors on the onset and course of problems (Dodge & Pettit, 2003; Dodge, 2002). Results of longitudinal and preventive studies provide empirical support for the framework (see Dodge & Pettit for a summary of many of these results).

A related framework for understanding and preventing antisocial behavior in particular is the Social Development Model (SDM, Catalano & Hawkins, 1996). The SDM draws on social learning, differential association, and social control theories, and the model "specifies how risk and protective factors interact in the development of prosocial and antisocial behavior" (Hawkins et al., 2003, p. 271). The SDM proposes that parallel developmental pathways lead to antisocial and prosocial behavior. Three sets of exogenous factors – position in the social structure (e.g., race/ethnicity, gender), individual attributes (e.g., temperament), and external constraints (e.g., social norms) – are hypothesized to be "mediated by the processes of socialization or social development that occur along the (prosocial and antisocial) pathways…." (Hawkins et al., 2003, p. 273).

According to the SDM, social development occurs in interaction with others as children encounter opportunities for social involvement (Catalano & Hawkins, 1996; Hawkins et al., 2003). The quality of involvement as well as a child's social interaction skills influence the extent to which involvement is perceived as meaningful and rewarding; rewarding social involvement, in turn, results in bonding with the social group. Bonding with the social group leads to acquisition of beliefs that reflect the norms and values of the group. The SDM proposes direct paths from beliefs to behavior, from bonding to behavior, and from rewards to behavior. Additionally, beliefs are proposed to mediate partially the effects of bonding on behavior, and beliefs and bonding are proposed to mediate partially the effects of rewards on behavior.

In the SDM, the structure of the pathway to prosocial outcomes is identical to that of the pathway to antisocial outcomes (Catalano & Hawkins, 1996; Hawkins et al., 2003). It is the quality of the processes that occur along the way that differentiates the two. For example, the path towards antisocial outcomes is characterized by (a) involvement with antisocial peers, (b) interaction skills that facilitate such involvement and that result it its being perceived as rewarding, (c) the formation of bonds with the antisocial peer group, and (d) acquisition of beliefs that legitimize antisocial behavior. Finally, the SDM explains antisocial and prosocial behavior across childhood and adolescence by proposing "a sequence of processes in each of a series of submodels specific to stages of development" (Hawkins et al., p. 273), and the model proposes considerable continuity in behavior across developmental stages.

Hawkins and colleagues (2003) summarized the results of research aimed at testing the SDM. These included bivariate tests of the direct relationships proposed in the model as well as structural equation models of the SDM as a whole (Herrenkohl et al., 2001; Huang, Kosterman, Catalano, Hawkins, & Abbott, 2001). Results indicated support for most proposed relationships. Interestingly, opportunities for involvement with prosocial others were not directly related to prosocial behavior, a finding consistent with the model's proposition that children must have the skills necessary to make interactions with a prosocial group rewarding, thus facilitating bonding with the group.

Research results indicated lack of support for a small number of relationships proposed by the SDM (Hawkins et al., 2003). For example, bonding to family was not found to be directly related to antisocial behavior, but the authors noted that analyses failed to account for whether the norms, beliefs, and actions of family members were prosocial or antisocial. In a structural equation model predicting violence at age 18, all proposed paths were significant and in the

hypothesized direction with the exception of the path from antisocial bonding to violence (Huang, et al., 2001). In a separate analysis, a set of models was fit to predict violence in sample members who initiated violence in childhood versus adolescence (Herrenkohl et al., 2001). Model fit was equivalent when parameters for the two subgroups (child onset and adolescent onset) were constrained to be equal, relative to an unconstrained model, indicating that identical causal processes led to violence at age 18 in those who initiated violence in childhood and in those who initiated violence in adolescence. The path from antisocial bonding to antisocial beliefs and the path from antisocial bonding to antisocial behavior were not significant in this model. In sum, research results supported the majority of the proposed relationships in the SDM. However, structural equation models indicated lack of support for hypothesized links from boding with antisocial peers to antisocial behavior.

Both an ecological developmental framework and the SDM highlight the importance of early intervention and multi-component interventions that target a wide range of risk and protective factors as key strategies for effective prevention (Catalano & Hawkins, 1996; Dodge & Pettit, 2003; Hawkins et al., 2003). Research on the SDM suggest that intervention in later childhood and adolescence are also key, and that such interventions should target identical causal processes in a developmentally appropriate manner. In addition to their implications for intervention in childhood and adolescence, both frameworks suggest a need to examine further (a) the course of violent offending across adolescence and into early adulthood, (b) risk processes for offending and how these operate over time, and (c) differences in the course of violent offending and risk across race (see also Williams, Ayers, Abbott, Hawkins, & Catalano, 1996) and gender subgroups.

Results of recent longitudinal research on offending provide additional evidence of a need for such work. In particular, studies that employ semiparametric group-based modeling shed light on the course of offending across childhood, adolescence, and adulthood. Such studies identify distinct developmental trajectories of offending (i.e., patterns of offending over time) for subgroups within a population (Nagin, 1999). Below we review one study that summarized findings of longitudinal research on offending (Piquero, 2004) and two studies (Broidy et al., 2003 and McDermott & Nagin, 2001) that used the trajectory methodology. Building on an ecological developmental framework and the SDM, these works guide the formulation of specific research questions for the current study

Longitudinal Studies of Offending

Piquero (2004) reviewed and summarized results of longitudinal research on offending. These findings indicated that (a) problem behavior often begins early in life; (b) the persistence of offending has been studied more than its desistance; (c) different factors may be related to the onset, persistence, and desistance of offending; and (d) use of new statistical methodology, especially the trajectory methodology, reveals considerable variation in how offending unfolds over time within distinct population subgroups and suggests that correlates of offending may vary across these groups. Additionally, longitudinal studies suggest that offending levels tend to decrease with age in adulthood for most population subgroups

Piquero (2005) examined in greater depth findings of studies that employed the trajectory methodology. (As described below in *Analyses*, he also noted important caveats about interpreting the findings of such studies.) Many studies examined offending in childhood and/or adolescence, and some studies followed respondents well into adulthood. A number of common findings emerged. Three offending trajectories identified in studies were consistent with patterns

predicted by developmental criminological theory: nonoffenders, chronic offenders, and adolescent onset (or "adolescent-peaked," p. 37) offenders. However, studies also identified trajectories not predicted by theory, including a group in which offending began during late adolescence (*late-adolescent onset*) and a group in which offending was high in early adolescence but decreased during adolescence (*desister*). Most studies identified three to four offending trajectories, with studies using self-report data identifying a somewhat higher number of groups. Relatedly, the number of offender groups identified was "robust to sample sizes over 500" (p. 38; see also Sampson, Laub, and Eggleston, 2004)). Piquero concluded by posing a number of research questions to guide future longitudinal studies. These included a need to examine further the group of individuals for whom offending begins late in adolescence and persists at least into early adulthood, to study desistance from offending (see also Bushway, Thornberry, & Krohn, 2003), and to investigate whether differences exist in offending trajectories across race/ethnicity groups.

Broidy and colleagues (2003) used longitudinal data from six sites in the U.S., Canada, and New Zealand to fit gender-specific models that identified developmental trajectories of childhood physical aggression and to investigate relationships between trajectory group membership and adolescent delinquency. Data on childhood aggression from each site included at least six measurement points extending over a period of three to nine years. Initial ages ranged from 6 to 7.5 years, and final measurement of childhood aggression occurred from ages 10.5 to 15. Across sites, models revealed three or four distinct trajectories of physical aggression for boys. The trajectory that best described the majority of boys in each site depicted a stable and low level of physical aggression. At each site there was at least one *chronic* trajectory, that is, a level of aggression that was initially high. At some sites aggression remained stable or decreased

slightly over time for these boys, but physical aggression increased in the chronic groups in both U.S. samples over much or all of the trajectory period. All models revealed rank stability in physical aggression over time, that is, average aggression of the chronic group was consistently higher than that of all other groups within each site. Interestingly, there was no evidence of late onset aggression (i.e., in early adolescence). In fact, stability in levels of physical aggression was a notable characteristic of all trajectories. Where aggression levels did change over time, these changes were gradual rather than abrupt.

Trajectories for girls were similar to those for boys in a number of respects (Broidy et al., 2003). First, at each site, the trajectories that described the majority of girls showed stable and low levels of physical aggression across childhood. Second, there was a chronic trajectory in each sample. Third, trajectories reflected rank stability in aggression for girls in five of the six samples. Finally, there was no evidence of late onset of physical aggression for girls, and aggression levels were typically stable over time. Differences by sex also emerged. The average levels of aggression in the chronic trajectories of girls were consistently lower relative to those in the chronic trajectories of boys (i.e., chronic girls exhibited lower aggression levels compared to chronic boys), but aggression levels in the chronic girls' trajectories were greater than those in the trajectories of nonchronic boys. Additionally, there was greater variability across samples in the number of distinct trajectories that depicted childhood physical aggression, suggesting greater heterogeneity for girls in how aggression unfolds over time.

Scores on scales measuring adolescent violent and nonviolent delinquency, measured at age 13 (two sites), 17 (one site), or 18 (one site), were available for five sites (Broidy et al., 2003). For boys, childhood physical aggression trajectories were related to adolescent violent delinquency in all of the samples. Similar results were found for nonviolent delinquency in four

of the five samples. Thus, high levels of physical aggression across childhood consistently predicted violent and nonviolent offending in adolescence for boys. Results for girls were less clear cut and suggested a weaker link between childhood physical aggression and adolescent delinquency. Multivariate analyses that included childhood nonaggressive conduct problems, oppositional behavior, and hyperactivity as covariates revealed that childhood physical aggression trajectories had "significant and independent influence on violent and nonviolent offending" (p. 234) for boys. Other conduct problems and oppositional behavior, but not hyperactivity, were also significant predictors of adolescent violent and/or nonviolent offending in multivariate models using data on boys. For girls, results of multivariate models yielded a less clear picture of relationships among childhood physical aggression and the covariates, taken together, and adolescent delinquency. No predictors were consistently related to delinquency across samples when controlling for the other variables.

Broidy and colleagues (2003) recommended extending their analyses across adolescence and into early adulthood to examine whether factors such as decreased adult supervision and increased interaction with peers influence the course of physical aggression over time. Of special interest is whether the absence of late-onset aggression suggested by their results obtains when aggression is measured at later ages.

McDermott and Nagin (2001) used data on 835 males from the first six waves of the National Youth Survey (NYS) to identify three distinct developmental trajectories of offending – violent and nonviolent – from ages 11 to 24. Estimated trajectory-group membership probabilities permitted assignment of each sample member to one of the three groups. Supplemental analyses were used to examine group profiles and estimate the effects of selected covariates on offending patterns across groups.

Members of the largest trajectory group (89% of the sample) reported low and stable rates of offending over time, with the majority reporting no offenses at any time (McDermott & Nagin, 2001). A second trajectory, which depicted offending for 6% of the sample, began with a high initial offending rate that declined over time, reaching approximately the rate of the low-stable group by age 23. The third trajectory began with a low offending rate, but the rate increased over time, surpassing the rate of the second group between ages 13 and 14. The rate continued to increase until age 18, after which age the trajectory failed to display a consistent trend. This trajectory reflected offending patterns over time for 5% of the sample.

Offender groups defined by the three trajectories differed significantly on mean levels of offending at each age, and they differed in theoretically-expected directions on mean levels of covariates (McDermott & Nagin, 2001). For instance, scores on measures of moral beliefs and time with family were higher for members of the low-stable group relative to the other groups. Supplementary analyses examined effects of age-to-age changes in covariate levels on changes in offending and whether effects were similar across the groups. Of note, increases in association with delinquent peers and in negative labels from parents were related to worsening offending over time for all groups. However, effects of covariates on the degree of change in offending differed across groups.

McDermott and Nagin (2001) noted that the number and shape of offender trajectories identified in the NYS sample did not correspond to trajectories identified in other longitudinal samples (e.g., absence of adolescent-limited and chronic groups in the NYS sample). The authors noted a need to examine further the NYS offender groups, to "formally contrast them with previously named offender types" (p. 308), and to investigate more precisely relationships between selected covariates and initiation, maintenance, and desistance of offending. In contrast

to results reported by Broidy and colleagues (2003), results of trajectory analyses using NYS data did suggest the existence of adolescent-onset group. However, offending was operationalized to include violent and nonviolent acts. Analyses that focus on violent offending would permit direct comparison with results from other studies with a similar focus.

Research Questions

The study used data from the NYS to examine developmental trajectories of violent offending and of risk levels across adolescence and into adulthood. We investigated the following research questions:

- How do violent offending trajectories that extend into adulthood compare with offending trajectories reported in other studies, especially with respect to the number and shapes of distinct trajectories (Broidy et al., 2003; McDermott & Nagin, 2001; Piquero, 2004)?
- How do background characteristics and risk factors differ across offending trajectory groups, that is, what are the risk profiles of distinct trajectory groups? Specifically, do fixed risk factors measured at Wave I (low SES, parent beliefs legitimizing aggression), and time-varying risk factors (youth's beliefs legitimizing aggression, bonding with delinquent peers, and lack of involvement in conventional activities) differ in predictable ways across trajectory groups (Catalano & Hawkins, 1996; Hawkins et al., 2003; Dodge & Pettit, 2003)?
- Is there evidence of onset of violent offending in late adolescence and if so, which risk factors are related to late-adolescent onset? Does late-adolescent onset characterize the violent offending trajectories of subgroups defined by sex and race/ethnicity (Piquero, 2004)?
- Are there distinct trajectories of risk levels over time for youth's beliefs legitimizing aggression, bonding with delinquent peers, and lack of involvement in conventional activities (Catalano & Hawkins, 1996; Dodge & Pettit, 2003; Hawkins et al., 2003)? Alternatively,

does a single trajectory for a particular risk factor describe changes in risk levels over time in the NYS sample?

- Are there distinct trajectories of risk levels over time using a cumulative risk index?
- If there are distinct trajectories of risk levels, do distinct dual trajectories of offending and risk exist? If so, what do the conditional and joint probability distributions of membership in offending group and risk group reveal about the relationship between risk and offending and how this changes over time (Catalano & Hawkins, 1996; Dodge & Pettit, 2003; Hawkins et al., 2003)?

Scope and Methodology

Sample

The study used data from Waves I to VII of the National Youth Survey (NYS, Elliott et al., 1985; Elliott et al., 1989). Wave I of the NYS occurred in 1977, when a national probability sample of youths and one parent or legal guardian were interviewed about events occurring in 1976 and about background and demographic information. The age of youth participants at Wave I ranged from 11 to 17 years. Follow-up surveys of youths occurred annually from 1978 to 1981 (Waves II to V). Additional follow-up surveys of youths occurred in 1984 (Wave VI – concerning events in 1983 when respondents were ages 18 to 24) and 1987 (Wave VII – concerning events in 1986 when respondents were ages 21 to 27). The NYS includes baseline information on youth and family background and demographic characteristics, and longitudinal data on the behaviors and attitudes of youths, as wells youths' perceptions of parent, neighborhood, and peer group factors. Items are suited to examining the incidence and prevalence of violent offending, related behaviors, and selected risk factors, and how these change over time. As described in detail below, the analysis sample included 1,227 respondents

with complete data from Wave I through Wave VII on measures of violent offending. Observations across waves were linked by creating a common identifier based on household and youth ID numbers (Kaye Marz, Inter-university Consortium for Political and Social Research, Ann Arbor, MI, personal communication, September 26, 2003).

Building a Longitudinal Dataset

Separate datasets for Waves I to VII were merged to create a single longitudinal dataset, using SAS system software (SAS Institute, 1988). The longitudinal dataset contained one observation per study participant and included measures of age at each wave, along with measures of fixed demographics and background characteristics. The dataset included measures of fixed risk factors (i.e., low SES; parent beliefs legitimizing aggression), and it also included wave-specific measures of violent offending and time-varying risk factors.

Fixed Risk Factors and Demographics

The NYS collected demographic and background information from parent(s) or adult caregivers of youths at Wave I. We included two fixed risk factors measured at Wave I. First, the Wave I dataset included a composite measure of household socioeconomic status (SES), based on the Hollingshead two-factor Index (Hollingshead, 1975), in which higher values of the measure indicated lower SES. Additionally, the risk factor, parent beliefs legitimizing aggression (PBLA), was measured using a single Wave I item: “How wrong is it for an adult like you to hit or threaten someone without any reason?” Lower scores on this measure reflected stronger beliefs legitimizing aggression. Measures of youth age at each wave, sex, and race/ethnicity were used in the analyses as well.

Measuring Offending

Self-reported violent offending was the dependent variable of interest. The National Youth Survey (NYS) included items asking about the number of times in the past year a respondent had performed a particular behavior. Responses were coded in two ways. The first was to record the actual reported frequency. The second used a response scale and was labeled "rate" in the variable codebook. Literature on studies using NYS data indicate that the coded rate is the preferred method for using responses to these items. Following the recommendations of Piquero, Macintosh, & Hickman (2002), the original nine-category response scheme (1 = "never" up to 9 = "2-3 times a day") was recoded into a three-category scheme to increase validity of the measure. This involved recoding the original categories 2 and 3 as 2s, and the original categories 4 to 9 as 3s.

Only behaviors that reflected the real or threatened use of physical aggression were included in the index of violent offending. Property destruction, theft, substance use, and similar behaviors were not included. Nine such behaviors were used consistently at Waves I to V. However, in Waves VI and VII, several behaviors were omitted, and others were added to reflect the increased age of respondents (e.g., *hit another student* was replaced with *hit someone at work*). These changes resulted in 10 aggressive behaviors being included at Wave VI and 7 behaviors at Wave 7 [1]. This approach to measuring violent offending with NYS data differs from the strategy described by Elliott and colleagues (1985; 1989). However, it follows the lead of McDermott and Nagin (2001), who used NYS data on boys to identify trajectories based on a similar index that included both violent and nonviolent acts.

[1] Details are available from the first author.

A summary index of offending was created for each wave by summing responses to the 9 recoded, three-category aggressive behavior items (Waves I to V), 10 items (Wave 6), or 7 items (Wave VII) and, because different numbers of items were used at different waves, dividing the sum by the number of items reported for each respondent. The summed measure could take values from 1 to 3. Preliminary analyses indicated that offending was low, decreased somewhat over time, but was fairly stable during the study period (see Table 1 and Figure 1). Due to the extreme positive skew of offending variables at each wave, a dichotomous measure of offending was created for each wave, using the 90th percentile as the cutoff. That is, a respondent was categorized as a "violent offender" if his or her score was greater than or equal to the 90th percentile for a particular wave. The percentages of respondents so classified were 11% (wave 1), 10% (wave 2), 16% (wave 3), 14% (wave 4), 12% (wave 5), 12% (wave 6), and 15% (wave 7), with ties yielding groups whose membership exceeded 10 percent. As shown in Table 1 and Figure 1, the 90th percentile cutoff point decreased more noticeably over time, relative to the mean across waves. Thus, some participants classified as violent offenders in the later waves undoubtedly displayed lower levels of offending relative to earlier waves. As warranted, supplementary analyses described below provided detailed information about the extent to which violent offending may have been overestimated during later waves because of the dichotomization scheme.

Table 1 about here

Figure 1 about here

It should be noted that offending was measured without accounting for exposure time, that is, we did not take into account the amount of time an individual was incarcerated and thus unable to offend. Piquero and colleagues (2001) showed that not accounting for exposure time

may result in underestimating offending levels. Moreover, offending over time may appear to decline for some individuals whose offending actually remains stable. These measurement concerns should be kept in mind when interpreting results.

Measuring Time-Varying Risk Factors

An ecological developmental framework for violent offending (Dodge & Pettit, 2003) and the Social Development Model (SDM, Catalano & Hawkins, 1996; Hawkins et al., 2003) highlight the influence of multiple risk factors. Although the NYS datasets lack measures of biological and early childhood risk, they do include measures of individual and environmental risk factors that are salient in adolescence and into early adulthood. Initially, four domains of risk were considered for use in this study:

- Beliefs legitimizing aggression (BLA)
- Bonding with delinquent peers (BDP)
- Neighborhood problems (NP)
- Involvement in conventional activities (ICA)

These variables were coded so that higher scores consistently reflected higher levels of risk; thus the fourth measure might be better termed lack of involvement in conventional activities. Because neighborhood problems were measured only in waves 4 to 7, the analyses reported here do not include these variables[2].

Youth's beliefs legitimizing aggression. Two items pertaining to the extent to which a respondent agreed that it is necessary (a) to beat up someone to gain peers' respect and (b) to play dirty in order to win were used to measure BLA at each wave. Scores on the two items were averaged.

[2] Descriptive results and results of trajectory models for neighborhood problems are available from the first author.

Bonding with delinquent peers. A measure of BDP was created based on the work of Elliott and colleagues (1985). First, scores were summed on three items regarding the amount of time spent with peers in the afternoon, evening, and weekend. Thus, youths who scored higher on this "peer involvement" measure spent more time with peers relative to other youths. Second, scores on 10 items, each measuring the proportion of one's peers who engaged in various delinquent activities (e.g., "stole something," "used marijuana," "hit someone"), were summed. The mean of this summed "delinquent peers" measure was calculated and subtracted from each observation's summed score, yielding a deviation score for each youth at each wave. Finally, the BDP measure was calculated for Waves I through VII as the product of the peer involvement score, and the delinquent peers deviation score.

Involvement in conventional activities. The Family School, and Community Involvement scales described by Elliott and colleagues (1985) measured the amount of time a youth spent on specific normative activities per week (e.g., homework, sports, school activities). In this study, scores on the three scales were standardized and averaged to create an aggregate measure of ICA. In the work of Elliott and colleagues, these scales were conceptualized as dimensions of *conventional bonding*, which also included dimensions reflecting a youth's commitment to conventional norms. The current focus is solely on the amount of time a youth spent on activities that were likely to be monitored by a prosocial adult, because lack of monitoring is thought to act as a key risk factor across adolescence. However, the current study examined offending and risk into early adulthood, and the amount and influence of adult monitoring are likely to decrease normatively as youths age. Part- and full-time employment, along with higher education, become the normative conventional activity for young adults, and longitudinal research suggests that a low level of employment is a salient risk factor for offending in late adolescence and early

adulthood (e.g., Piquero, Brame, Mazerolle, & Haapanen, 2002). Therefore, the measure of ICA used in this study included a measure of employment, based on the number of hours worked per week and weeks worked per year reported by respondents. These items appear in waves 4 to 7 of the NYS. Thus, for waves 4 to 7, the ICA measure was calculated as the average of the standardized Family, School, and Community Involvement scores and the standardized aggregate measure of employment. The measure of ICA was coded so that higher scores reflected higher levels of risk (i.e., lack of involvement in conventional activities) so that all risk factors were coded consistently.

Finally, a time-varying cumulative risk index was created, based on the number of time-varying risk factors on which a respondent's score fell in the upper 90th percentile of scores for each risk. Preliminary analyses indicated that risk trajectories differed markedly across risk domains in terms of the optimal number and shapes of trajectories. Thus, the current report focuses on risk trajectories by domain and not on cumulative risk[3].

Analyses.

The chi squared and *t* statistics were used to compare observations included in the final sample with observations that were dropped on background variables, aggression, and risk variables. Descriptive analyses were conducted on all study variables. The SAS procedure TRAJ was used to fit models identifying the optimal number and shapes of violent offending trajectories over adolescence and early adulthood (Jones, Nagin, & Roeder, 2001; Nagin, 1999). Analyses followed guidelines provided by these authors for fitting models and selecting the best-fitting model (based on the maximum Bayes' Information Criterion), conducting supplementary analyses (e.g., examining estimated probabilities of membership in each trajectory group and

[3] Results of cumulative risk trajectories are available from the first author.

assigning sample members to trajectory groups), and describing trajectory group profiles. Supplementary analyses using the TRAJ procedure, as well as chi-squared tests, analyses of variance, and logistic regression, yielded results aimed at clarifying the makeup of violent offending trajectories and predictors of group membership.

In a similar fashion, models were fit to identify distinct trajectories of time-varying risk factors, separately by risk domain. Based on results of these analyses, dual trajectory models of offending and risk level (e.g., offending and adult monitoring) were fit to examine more closely relationships between risk and offending over time (Nagin & Tremblay, 2001). The marginal, conditional, and joint probability distributions of membership in offending group and risk group were examined to describe the overlap in risk and offending patterns, following the lead of Nagin and Tremblay (2001), who used this approach to analyze the dynamic nature of comorbidity of aggression and hyperactivity over time. Here, offending and risk status are not conceptualized as disorders, but rather, as distinct yet related attributes. Hence, the term comorbidity is not accurate, but the strategy provided insight into the dynamic interrelationship of risk and offending. Finally, single trajectory models of offending and of risk were fit separately for demographic subgroups defined by respondents' race/ethnicity and sex. All single- and dual-trajectory models of offending were based on the logit model for a dichotomous dependent variable. Risk trajectories were fit using the censored normal distribution.

Piquero (2004) and Sampson and colleagues (2004) identified features of the trajectory methodology that have important implications for interpreting its results. Trajectory models yield parameter estimates and related statistics that provide an "approximation of a more complex underlying reality" (Piquero, p. 15). In other words, the procedure identifies distinct trajectories that are thought to correspond, approximately, to the course of offending over time for distinct

population subgroups. The procedure provides an estimated probability of membership in a particular group for each individual, and it classifies each individual as being a member of that group for which the probability of membership is highest. This does not imply that a particular individual belongs to one and only one group with certainty. Nor does it imply that the behavior of a particular individual will correspond exactly to the pattern of offending described by the particular trajectory into which she or he is classified. Readers should keep in mind when interpreting the results reported below that the methodology yields a descriptive and probabilistic model that incorporates uncertainty when identifying distinct trajectory groups and when classifying individuals as members of a particular group.

Findings I: Descriptive Statistics and Violent Offending Trajectories

Comparing Kept and Dropped Observations

The TRAJ procedure can handle missing values. However, a focus of the current study was to examine violent offending trajectories into adulthood using Wave VI and Wave VII data. Missing values on measures of offending were concentrated in later Waves of the NYS: Wave I (n = 6); Wave II (n = 70); Wave III (n = 99); Wave IV (n = 182); Wave V (n = 231); Wave VI (n = 228); and Wave VII (n = 342). Thus, a conservative approach was adopted whereby only observations with full data on violent offending at each wave were included in trajectory analyses. Applying this criterion yielded a final sample of size n = 1227. Of the original 1725 participants at Wave I, 498 (29%) were dropped due to missing values.

Chi squared and *t*-tests revealed significant differences between included and dropped observations on a number of background and substantive variables (see Table 2 for details). Specifically, older participants, males, youths of color (relative to white youths), and participants with higher SES, were over-represented in dropped observations. Participants classified as

violent offenders at Wave I were more likely to be dropped, relative to non-offenders (39% compared with 27% of observations not so classified); the same was true with respect to offending at Wave IV (26% of those classified as offenders were dropped, compared with 20% of those not classified as offenders). Differences at other waves were not significant. Note that increasing numbers of observations had missing values on offending in progressive waves, because a missing value on an item used to create the measure of offending was the criterion used to drop an observation. Differences on BLA risk between kept and dropped observations were significant at Waves II, III, IV, and V. At each wave, the mean for the dropped group was higher relative to the mean of the group retained in the final sample. No significant differences on BDP risk emerged across the seven Waves. Differences on ICA were significant for Waves I to IV, with those dropped having scores reflecting lower levels of risk relative to those retained in the final sample.

To gain greater insight into predictors of being dropped from the analysis sample, a logistic regression model was fit that included all background and Wave I offending and risk variables. Results (not shown) indicated that males (OR = 1.8, $p < .01$), older youths (OR = 1.1 for each year increase in age at Wave I, $p < .05$), lower SES youths (OR = 1.1 for each 10-point increase on the SES measure, $p < .05$), and youths classified as low risk on BDP (dichotomized at the 90th percentile for this analysis only, OR = 1.6, $p = .05$) were more likely to be excluded from the final sample. Race/ethnicity was marginally significant, with youths of color more likely to be excluded from the final sample (OR = 1.3, $p = .07$).

Table 2 about here

Brame and Piquero (2003) examined the implications of missing data for analyzing criminal offending over time using data from the first five waves of the NYS. The authors showed that

there was likely to be a positive relationship between dropping out of the sample and offending in later waves, although by definition this could not be directly observed. Thus, data from later waves were likely to underestimate the true offending level as youths aged. The authors also provided an analytical framework for estimating the magnitude of the effects of sample attrition. They concluded that the effects of sample attrition were likely to be meaningful, but they also concluded that their results implied "that attrition only accounts for a modest percentage of the decline in offending activity that is evident between the first and fifth waves" (Brame & Piquero, p. 123). These findings should be kept in mind when interpreting the results of offending trajectories presented below.

Descriptive Statistics: Final Sample

As described under *Measures*, offending and risk variables used in the trajectory models were calculated as the sum or average of multiple items. Descriptive statistics reported in this section summarize the distributions of all variables as they were coded for use in trajectory models. Detailed descriptive statistics on all items used to create composite measures are available from the first author. Table 3 provides descriptive statistics for background and demographic variables as well as measures of violent offending and risk status. Scores on substantive variables reflected low levels of offending and risk for the majority of youths in the final sample (see Table 3 for details).

Table 3 about here

As shown in Table 3, respondents' ages in the analysis sample ranged from 11 to 17 years at Wave I (M = 13.78, SD = 1.96) and from 21 to 27 years at Wave VII (M = 23.78, SD = 1.96). The variation of age within each wave is due to the fact that the NYS used an accelerated cohort design in which respondents of different ages were interviewed at each wave. This design

feature has implications for how the results of the trajectory models are presented and how results should be interpreted. With respect to presentation, the dependent variable (e.g., offending, risk) in a particular trajectory model is described as a function of age. That is, the trajectory models and related graphs depict how offending changes as youths grow older, because age is the independent variable in each model. At each data collection point (i.e., at each wave), respondents of different ages were interviewed. The trajectory graphs included here depict seven waves of data, each of which is anchored at the *average* age of respondents at a particular wave. For example, each trajectory graph shows the first data point as occurring at age equal to 14, the Wave-I average rounded to the nearest whole number. With respect to interpretation, Sampson and colleagues (2004) argued that using the trajectory approach with data from an accelerated longitudinal design such as this carries a potential for confounding the effects of development with history. The authors warn against "automatically attributing the unfolding of trajectories to development (aging) effects rather than historical change" (Sampson et al., 2004, p. 40).

Trajectories of Violent Offending

We followed steps detailed by Jones and colleagues (2001) and Nagin (1999) to identify violent offending trajectories and their correlates, with attention to statistical indicators of model fit and parsimony (i.e., a preference for fewer rather than more trajectories). The first step was to fit models specifying different numbers of trajectories and to identify the model with the optimal number of trajectories using, first, the maximum (i.e., least negative) Bayes' Information Criterion (BIC). We fit six models, specifying two to seven trajectories. The 5-group model yielded the best BIC of –2,793 (see Figure 2).

Figure 2 about here

The TRAJ procedure provided estimated probabilities of trajectory group membership for each sample member for each trajectory identified by a model (Jones et al., 2001). Membership in a particular trajectory group implies that the trajectory accurately depicts a child's level of residential restrictiveness over time. According to Nagin (1999), a sound model is one in which all sample members have a high probability of belonging to one trajectory group and a low probability of belonging to all other trajectory groups. If these conditions hold, it is reasonable to extend the analysis by refitting a model to include covariates of membership in the trajectory groups. Table 4 shows average probabilities of membership in each trajectory group by group-classification status and provides support for the 5-group model. It should be noted, however, that these results suggest a possible overlap between groups 1 and 2. As emphasized earlier, readers should keep in mind that trajectory shapes, estimated probabilities, and group membership represent approximations, based on a statistical model, of how offending changes over time in different population subgroups (Piquero, 2004; Sampson, Laub, & Eggleston, 2004).

Based on the selected model, Figure 2 depicts five trajectories of violent offending. We discuss these here in decreasing order based on the percentage of sample members falling into a particular group. As shown in Figure 2, the largest group can be termed the *low/stable* group (group 2 in the model output). Model estimates indicated that 67.6% of sample was included in this group. The probability of being classified as a violent offender remained low and stable – close to 0 with a slight increase around age 16 to almost .10 – for this group over the entire period. That this trajectory group comprised the majority of youths in the sample is consistent with much prior research indicating that most youths report low levels of offending over time (Piquero, 2004).

The second largest trajectory (group 4 in the model output) identified here – termed *adolescent onset* – is also consistent with conceptual and empirical work on offending (but note differences relative to the findings of Broidy and colleagues, 2003, and of McDermott and Nagin, 2001, summarized above). The probability of being classified as a violent offender was initially at about .05, but increased steadily from the beginning of the study period, when the average age of the sample was 13.78. The rate of change increased noticeably at about age 15. At age 18 the probability peaked at close to .50, and then began to fall gradually, to about .30 by the end of the study period. The adolescent onset group comprised 11.9% of the NYS Sample.

Of special interest in these analyses was whether violent offending by the adolescent onset group persisted into young adulthood. As coded for these analyses our measure only captured whether an observation was classified in the top 90th percentile of offenders; it did not reflect directly the level of offending. To assess the absolute level of offending by the adolescent onset group, we calculated the average score on the original summed (i.e., undichotomized) offending variable for the group at each wave, and compared this average with the sample-wide level of offending. The summed offending measure ranged from 1 to 3. At Wave I, the 75th percentile in the full sample was 1.11, and the 90th percentile was 1.33. The average score on this measure for the adolescent onset group at Wave I was 1.11 (i.e., right at the 75th percentile). The average for the adolescent onset group was higher at subsequent waves, exceeding the sample 75th percentile at Waves II to VII, and it came close to the 90th percentile at Waves III, IV, and V. At Wave VI, the 75th and 90th percentiles in the sample were 1.10 and 1.20 respectively; the adolescent onset average at Wave VI was 1.13. At Wave VII, the 75th and 90th percentiles were 1.00 and 1.17 respectively, and the adolescent onset group mean was 1.08. In sum, the absolute level of offending for the adolescent onset group remained higher than that of the majority of the sample

into young adulthood. However, similar to the full sample, offending for this group followed a trend where offending levels decreased as youths aged. Nevertheless, the Wave VII mean for this group, 1.08, was close to the 75th percentile for the full sample at Wave I, 1.11, when offending was at its highest level.

For a third group of youths (group 1 in the model output), the probability of being classified as a violent offender was initially low (approximately .10), declined to near zero and remained low and stable until age 18, then increased steadily, to over .30, by the end of the study period. This pattern of offending, termed here *young adult onset*, corresponds to the late-adolescent onset trajectory described by Piquero (2004). Of note, this pattern does not correspond to developmental taxonomic theories of offending. In this sample, 11.8% of members were so classified, making it the third largest trajectory group resulting from these analyses. As noted above, however, group membership probabilities shown in Table 3 suggest the possibility of an overlap between this group and the low stable group.

An *early onset/chronic* trajectory (group 5 in the model output) was characterized by a relatively high probability (.70) of classification as an offender at the beginning of the study period. The probability increased to almost .90 by age 16, at which point it decreased slightly, to about .65 by age 21. This decrease was followed by a slight and steady increase, to about .80 by age 24. Approximately 5.3% of the youths in the sample were categorized as chronic offenders by this analysis.

Given the overall tendency of offending levels to decrease over time, albeit modestly, there was a need to examine offending as initially measured at later waves for the early onset/chronic group. The aim was to assess whether the classification "violent offenders" reflected comparable levels of violent behavior in later waves, relative to earlier waves To this end, we compared the

average of the original summed offending score for this group with sample-wide scores on this measure at earlier waves. At Wave VII, the average for the chronic group was 1.28, which corresponded to a score between the 75th and 90th percentiles on this measure at Wave I for the entire sample. A score of 1.28 was greater than the 90th percentile at all other waves. Similar results were found for Wave VI (see Table 1). These results indicated that, on average, members of the chronic group continued to display high absolute levels of violent offending even in later waves.

Finally, in the fifth and smallest trajectory (group 3 in the model output), the probability of classification as a violent offender was initially close to .90. In contrast to the chronic offender group, however, the probability decreased markedly and steadily over much of the study period, to about .10 by age 21. The probability increased slightly, to approximately .18, by age 24. This *early onset/desister* group included 3.4% of the sample, and it corresponded to a similar trajectory identified by McDermott and Nagin (2001) using data from the first six waves of the NYS and a measure of offending that included nonviolent and violent offending. As emphasized by Piquero (2004), other studies that used the trajectory methodology identified a desister group, although such a trajectory does not fit current developmental criminological theories about the onset and course of offending.

Trajectory Group Profiles

Table 5 provides results of chi-squared analyses and analyses of variance comparing the five trajectory groups on background and demographic variables and baseline risk. To aid by-variable comparison across trajectory groups, the first column in Table 5 also summarizes these characteristics for the full sample. In contrast, the following discussion highlights the profile of characteristics within each group and does not utilize results of statistical tests because the wide

range in sample sizes across groups was likely to influence strongly whether statistical significance was present. Groups are discussed in decreasing order based on size.

Table 5 about here

Low/stable (group 2). The low/stable group comprised 67.6% of the sample. Males were less likely to be members of this group (40.1%) relative to their representation in the full sample (50%). Members of this group were similar to the full sample on age at Wave I, race/ethnicity, and Wave I SES and PBLA. In contrast, they appeared to be at lower risk at baseline with respect to beliefs legitimizing aggression (BLA) and slightly lower on bonding with delinquent peers (BDP). Scores on Wave I involvement in conventional activities (ICA) were similar to those of the full sample. In sum, the low/stable group included a higher proportion of females and youths with lower levels of risk in two of three domains relative to the full sample.

Adolescent onset (group 4). Approximately 11.9% of the youths were classified as members of the adolescent onset group. Males made up a higher proportion of this group (71.2%) relative to their numbers in the full sample, and the average age of this group was lower at baseline (13.2 years) compared to the average age of the full sample (13.78 years). White youths were less likely to be members of this group (75.3%) relative to their representation in the full sample (81.4%), however the opposite was true for African American youths (18.5% of this group, compared to 13.9% of the full sample) and for other youths of color (6.2% of this group, compared to 4.7% of the full sample). Members of this group were roughly comparable to the full sample with respect to Wave I PBLA, Wave I SES, and Wave I ICA. The average score on BLA was somewhat higher than the sample average for this group, but interestingly, the average score on bonding with delinquent peers at Wave I was slightly lower than that of the full sample. To sum up, the adolescent onset group included a higher proportion of males and youths of color,

relative to the full sample. However, this group was not distinguished by especially high levels of baseline risk.

Young adult onset (group 1). The young adult onset group comprised 11.8% of the sample. Its members were more likely to be male (61.4%), and a lower percentage of this group (2.1%) was classified as high risk at baseline on beliefs legitimizing aggression relative to the full sample. Otherwise, members of this group were comparable to the full sample in terms of demographics and baseline risk.

Early onset/chronic (group 5). The early onset/chronic group made up 5.3% of the sample. Males comprised the majority of this group (86.2%). White youths were slightly under-represented in this group (76.9%, compared to 81.4% of the full sample), whereas the proportion who were African American was equal to the proportion of African Americans in the full sample (13.9%). Other youths of color made up 9.2% of this group, compared to 4.7% of the full sample. The baseline mean age, mean SES, and mean PBLA were comparable for this group, relative to the full sample. However, this group had substantially higher mean scores, compared to the full sample, on all three time varying-risk factors measured at Wave I. In summary, this group was composed largely of males and youths with high levels of baseline risk on beliefs legitimizing aggression, bonding with delinquent peers, and involvement in conventional activities.

Early onset/desister (group 3). The smallest group (3.4%) identified in these analyses followed an early onset/desister violent offending trajectory. Relative to the full sample, a greater proportion of this group was male (66.7%). The average baseline risk level on beliefs legitimizing aggression, bonding with delinquent peers, and involvement in conventional activities was higher for this group compared to the full sample. The group was composed of a

lower proportion of white youths (71.4% versus 81.4%) and of other youths of color (2.4% versus 5.7%), and a higher proportion of African American youths (26.2% versus 13.9%), relative to the full sample. Of all groups, the early onset/desister group had the lowest average SES at baseline (i.e., highest scores on the SES measure), but PBLA was comparable with the full sample. When interpreting these results, it is useful to keep in mind the small size of this group (n = 42, 3.4%).

Comparing Selected Trajectory Groups

Comparing selected pairs of trajectory groups provides additional insight regarding correlates of violent offending trajectory group membership. For example, it is instructive to compare the two early onset groups (chronic versus desister) to identify characteristics that distinguished youths who were violent offenders initially but who desisted, from those who were violent offenders initially but who persisted. Additionally, all other trajectory groups were compared in pairwise fashion with the largest, and normative, low/stable group. To make these comparisons, we created new datasets each of which included members of only the two groups under comparison, and fit logistic regression models to identify significant correlates of membership in a specific group controlling for the effects of other variables. All models included demographic and background variables as well as baseline measures of risk status.

Early onset chronic versus early onset desister. The Wave I probability of classification as a violent offender was similar for these two groups. A single variable in a multivariate logistic model, sex, was a significant predictor of inclusion in the early onset/chronic group, relative to the early onset/desister group. Males were more likely to be in the former group (OR = 3.1, $p <$ .01). Of note, none of the baseline measures of risk distinguished these groups, after controlling for background and demographic characteristics.

Low/stable versus adolescent onset. The probability of classification as a violent offender was close to zero for both of these groups at Wave I, but for one group it began to increase early in the study period. Five variables were significant predictors of being in the adolescent onset group, relative to the low/stable group: sex, age at Wave I, SES, parent beliefs legitimizing aggression (PBLA), and youth beliefs legitimizing aggression (BLA). Males were more likely to be in the adolescent onset group relative to females (OR = 3.7, $p < .01$), as were youths who were younger at baseline (OR = 1.2, $p < .01$, for each year decrease in age). It should be noted that the finding regarding age is likely a result of the fact that age at Wave I varied from 11 to 17, and older youths had already aged beyond the point of adolescent onset (i.e., approximately age 15). The association with the probability of being in the adolescent onset group, relative to the low/stable group, was positive for SES (OR = 1.2, $p < .01$, for each 10-point increment change in SES), indicating that youths from less affluent households were more likely to be in the adolescent onset group. The association was negative for PBLA (OR = .57, $p < .01$), indicating that youths whose parents endorsed stronger beliefs legitimizing aggression (i.e., a lower PBLA score) were more likely to be in the adolescent onset group. Higher scores on BLA at baseline were positively associated with the probability of being in the adolescent onset group, relative to the low/stable group (OR = 1.4, $p < .05$).

Low/stable versus young adult onset. The trajectory model identified a group – the young adult onset group – for whom risk of being classified as a violent offender was initially low, remained fairly stable, but increased moderately and steadily beginning about age 18. Males were more likely than females to be in this group (OR = 2.5, $p < .01$), relative to the low/stable group. Similarly, youths with higher scores on bonding with delinquent peers (BDP) at Wave I were more likely to be in the young adult onset group (OR = 1.3, $p < .05$, for a 50-point change

in score[4]). Baseline SES was also a significant predictor in this model, with lower SES associated with greater probability of being in the young adult onset group relative to the low/stable group (OR = 1.1 for a 10-point increase in the SES measure, $p < .05$).

Low/stable versus early onset/chronic. These two groups reflected extremes in patterns of violent offending over time. Three demographic variables, sex and baseline age and SES, along with Wave-I levels of the three time-varying risk factors, were significant predictors of being in the early onset/chronic group relative to the low/stable group. Males, relative to females (OR = 10.1, $p < .01$), youths who were older at Wave I (OR = 1.2 for each year change in age, $p < .05$), and youths with lower SES (OR = 1.2 for each 10-point increase on the SES measure) were more likely to be members of the early onset/chronic group. Wave I scores indicating higher risk on beliefs legitimizing aggression (BLA, OR = 1.7, $p < .01$), bonding with delinquent peers (BDP, OR = 1.8 for a 50-point change in score, $p < .01$), and (lack of) involvement in conventional activities (ICA, OR = 1.9, $p < .05$) were positively related to membership in the early onset/chronic group.

Low/stable versus early onset/desister. African American youths, relative to white youths (OR = 2.5, $p < .05$), were more likely to be members of the early onset/desister group than the low/stable group. Identification as Hispanic, Native, or Asian (combined here due to small numbers) was not a significant predictor in this model. Baseline BLA score (OR = 2.6, $p < .01$) and BDP score (OR = 1.9, for a 50-point change in score, $p < .01$) were also significant predictors of membership in the early onset/desister group, relative to the low/stable group. Sex was not a significant predictor in this model.

Summary: Violent Offending Trajectories

[4] Range of BDP at Wave I was -105.74 to 434.26

The best model identified five distinct trajectories of violent offending over time: low/stable (67.6%), adolescent onset (11.9%), young adult onset (11.8%), early onset/chronic (5.3%), and early onset/desister (3.4%). Of note, there was one trajectory in which the probability of being classified as a violent offender remained high over the entire study period. This suggests that serious violent offending in the early onset/chronic group persisted into early adulthood. Additionally, violent offending persisted into young adulthood for the adolescent onset group, although the trajectory for this group was decreasing after age 18. Implications of the way our dichotomous offending variable was computed, as discussed above, should be kept in mind when interpreting these results.

Further analysis based on trajectory group membership indicated that being male was the most consistent risk factor for membership in a trajectory group for which the probability of classification as a violent offender was high, relative to the largest and normative low/stable group. Risk associated with beliefs legitimizing aggression and bonding with delinquent peers, measured at baseline, were predictive of membership in these trajectory groups as well. Other risk measures, as well as other demographic measures, were less consistently related to trajectory group membership.

These results provide insight into the nature of violent offending into young adulthood and into the influence of baseline measures of risk on offending. However, the results shed no light on the dynamic interaction of risk and offending over time. The following sections address this issue. We begin by describing results of trajectories of risk status measured at Waves I to VII. As noted earlier, analyses not reported here examined risk trajectories using a cumulative risk index. However, as will be shown, it appears that risk trajectories differ markedly across different risk domains.

Findings II: Risk Trajectories

Beliefs Legitimizing Aggression

Over the seven waves, the measure of beliefs legitimizing aggression (BLA) showed a steady decline in the full sample (see Table 3). Using the same procedures describe above, we fit various trajectory models to discover distinct patterns of change on this risk factor over time. Based on the highest BIC criterion (Jones et al., 2001), a seven-group model provided the best fit to the data (BIC = -6956). Figure 3 depicts the seven trajectories of BLA. Table 6 shows the average estimated probabilities of membership in each group across trajectory groups. It should be noted that these probabilities suggest a possible overlap in groups, despite the fact that the seven-group BLA model had the highest BIC. Characteristics of the trajectory groups are described in decreasing order based on group size. Table 7 provides results of descriptive analyses of the undichotomized measure of offending measured at each wave for the seven BLA trajectory groups.

Figure 3 about here

Table 6 about here

Table 7 about here

Low/stable (Output group 2). The largest trajectory group (n = 341, 27.8%) was characterized by a low and stable level of risk on beliefs legitimizing aggression (BLA) across the seven waves (see Figure 3). The majority of the low/stable BLA risk group was female (72%) and white (90%). African Americans were less likely to be members of this group (5.3%) relative to their numbers in the full sample (14%). Average age of the group at baseline was 14.1 years, compared to 13.9 in the full sample. SES scores at Wave I were lower for this group (M = 39.5, versus 43.0) indicating youths were from more affluent households, and parental beliefs

legitimizing aggression were similar (*M*s = 3.8). As shown in Table 7, average offending scores for the low/stable BLA risk group were below those in the full sample at every wave, although the degree of difference narrowed over time (*M* = 1.05 for this group and *M* = 1.11 for the full sample at Wave I; *M* = 1.02 for this group and *M* = 1.04 for the full sample at Wave VII).

Low-moderate/slow decrease (Output group 3). Risk level on BLA was low to moderate at baseline for this group, remained stable until about age 16 and then decreased slowly over the remainder of the study period. This group comprised 26.2% (*n* = 322) of the sample. Females made up 56% of this group, and the group was 85% white. Age (*M* = 13.8), SES (*M* = 43.3), and PBLA (*M* = 3.8) at Wave I were similar to averages in the full sample. Average scores on offending were extremely close (slightly lower) at all Waves for the low-moderate/slow decrease BLA risk group relative to the full sample (see Table 7).

Low-moderate/stable (Output group 5). Risk level on BLA for this group was similar at baseline to that of the previous group (see Figure 3). However, risk level over the study period remained stable for this group, which made up 24.8% of the sample (*n* = 304). Males comprised 64% of this group; white youths were somewhat under-represented (75% versus 81% in the full sample) and African Americans were slightly over-represented (17.4% versus 13.9%) in the group. The average age was 13.4 for this group, that is, lower than the average age in the full sample (13.8 years). Average SES scores at baseline were higher (i.e., indicating a lower level of SES; *M* = 44.9) relative to the full sample (*M* = 43.0) and PBLA average scores were the same. The low-moderate/stable BLA risk group had average offending scores that almost exactly paralleled those in the full sample across the seven waves of data collection (see Table 7).

Moderate/slow decrease (Output group 4). Risk on BLA was moderately high at baseline and decreased slowly over time for this group, which comprised 11% (*n* = 135) of the sample.

The group was predominantly male (66%). White youths made up 74.6% of the group (versus 81.45% of the full sample), and African Americans 23.1% (versus 13.9% in the full sample). The average age (*M* = 13.95) and SES scores (*M* = 45.9) at baseline were slightly higher than respective averages in the full sample, and Wave I PBLA (*M* = 3.8) was similar to that of the full sample. As shown in Table 7, average offending scores were higher at all waves for the moderate/slow decrease BLA risk group, relative to the full sample (1.19 versus 1.11 at Wave I; 1.07 versus 1.04 at Wave VII).

Increasing/decreasing (Output group 6). Risk level on BLA was moderate at baseline for this group (*n* = 51, 4.2%). In contrast to all other trajectory groups from this model, the risk level increased for this group, until about age 17, when it reached a moderately high level (see Figure 3). At age 17, the risk level began a steady decrease over time, reaching baseline level by the end of the study period. This group was largely male (78.4%). White youths were somewhat under-represented in the group (76.5%) relative to the full sample (81.4%), and African Americans were over-represented (21.6% versus 13.9%). The average age of the increasing/decreasing BLA risk group was 13.7, average SES was 45.2, and average PBLA was 3.8. Offending levels in this group were higher than those of the full sample at all waves, and the increase, and subsequent decrease, in BLA risk levels were paralleled by changes in offending mean scores over time (see Table 7).

Moderate/quick decrease (Output group 1). Baseline BLA risk for this group was similar to that of Output group 4, described above (see Figure 3). However, the risk level for this group decreased at a much faster rate, relative to the moderate/slow decrease BLA risk group. This group included 45 sample members (3.7%). It was split roughly evenly with respect to sex (53% male, 47% female). White youths were somewhat under-represented in this group (76%) relative

to their numbers in the full sample (81%), and African American youths were over-represented (20% versus 14% in the full sample). Youths were comparable to those in the full sample with respect to Wave I age (*M* = 13.9 in the low/stable group versus 13.8 in the full sample), SES (*M* = 42.4 versus 43.0), and parental beliefs legitimizing aggression (*M* = 3.7 versus 3.8). The average offending score was slightly higher for this group, relative to the sample as a whole, at Waves I to IV, but lower than, or equal to the average of the full sample in Waves V, VI, and VII (see Table 7).

High risk/decreasing (Output group 7). The smallest group (*n* =29, 2.4%) identified in the trajectory model was characterized by the highest level of BLA risk at baseline and across the study period, although absolute risk levels decreased steadily over time (see Figure 3). This group was the most heavily male (86.2%) and African American (27.6%) of the trajectory groups. The average age at baseline was 13.5, relative to an average of 13.8 in the full sample. Average scores at Wave I on SES were 46.3 and on PBLA were 3.8. Average scores on offending were consistently higher than in the full sample, and higher relative to those of all other groups, throughout the study period (see Table 7).

Comparisons among groups. We used analysis of variance at each wave to compare average offending levels across the seven BLA risk groups. Results were largely consistent at each wave. The mean offending scores for the high/decreasing and increasing/decreasing BLA risk groups – and to a lesser extent, the moderate/slow decrease BLA risk group – were significantly greater than the means of the other groups at each wave, in pairwise comparisons. The low/stable mean was significantly lower than the mean of all other groups at Wave I, and lower than the mean of most groups at subsequent waves. Table 7 includes the estimated R^2 for each wave-specific model. These ranged from .20 to .04, and were larger at earlier waves. These results suggest that

BLA trajectory group membership explained a substantial proportion of the variance in offending, especially in the earlier waves. Complete details of analyses of variance and results of pairwise comparisons are available from the first author.

Summary. Seven distinct trajectories of risk related to beliefs legitimizing aggression (BLA) were identified in this analysis. Risk decreased consistently over time in all but two of the groups (the increasing/decreasing and low-moderate/stable groups), and higher levels of risk appeared to correspond to higher average violent offending levels across the waves. BLA risk trajectories accounted for a significant proportion of the variance in offending at each wave, and this effect was largest in the earlier waves. Similar to the offending trajectory groups described earlier, BLA groups with higher levels of risk included higher proportions of males, and white youths were more likely overall to be members of groups with lower levels of BLA risk.

Bonding with Delinquent Peers

Average scores on the measure of bonding with delinquent peers (BDP) displayed a steady increase over the study period, as shown in Table 3. Analyses using the TRAJ procedure (Jones et al., 2001) revealed seven distinct patterns of change over time in this variable (BIC of the seven-group model = -39,858). A model identifying eight trajectory groups yielded a somewhat larger BIC (-39,833); however, a number of redundant groups were apparent in the latter model. The eight-group model also included two groups that comprised less than one percent of the sample each. Thus a seven-group model appeared to provide the best account of how bonding with delinquent peers changed over time for distinct subgroups of respondents.

Figure 4 shows the seven BDP trajectory groups. Table 8 shows the average estimated probabilities of membership in each group across trajectory groups. It should be noted that the seven-group model also identified groups that were, potentially, similar. This was especially true

for three groups in which levels of BDP were relatively low and stable over time. Preliminary analyses of the three potentially redundant groups using analysis of variance with pairwise comparisons indicated, however, that average BDP scores differed significantly among the three groups at all waves. Additionally, average offending scores differed significantly among the three groups at the first four waves, and in two pairwise comparisons at Waves V, VI, and VII. We describe characteristics of the seven BDP trajectory groups below in decreasing order based on group size. Table 9 provides average scores on the summed undichotomized measure of offending at each wave for each trajectory group.

Figure 4 about here

Table 8 about here

Table 9 about here

Low/stable (B) (Output group 2). A low and stable level of risk on bonding with delinquent peers (BDP) characterized a group that made up 39.0% (n = 479) of the sample (see Figure 4). Given its size, it is not surprising that the characteristics of this group were similar to those of the full sample. The low/stable (B) group included a somewhat higher proportion of females (54.5%), but the distribution of race/ethnicity corresponded to that of the full sample (83.0% white, 11.3% African American). Age (M = 13.9), SES (M = 43.3), and PBLA (M = 3.8) were quite similar to that of the full sample. As shown in Table 9, average offending scores were close to, but slightly lower than, those of the full sample at each wave.

Low/stable (A) (Output group 1). BDP risk levels were slightly higher and followed a similar pattern over time in a second large group (n = 383, 31.2%) This group was predominantly female (59.5%). White youths were somewhat under-represented in the group (77.2%, compared to 81.4% of the full sample), and African American youths were somewhat over-represented

(19.1%, compared to 13.9% of the full sample). The average age at Wave I was lower in this group (M = 13.25) by about one half year relative to the full sample, but average SES at baseline was similar (M = 42.9, compared to M = 43.0 in the full sample), as was the average score on parental beliefs legitimizing aggression (PBLA, Ms = 3.8 for this group and the full sample). Average offending scores for the low/stable (A) BDP risk group appear in Table 9, and these were lower than those of the full sample at each wave.

Moderate/stable (Output group 3). As shown in Figure 4, BDP risk levels were somewhat higher for a third trajectory group (n = 177, 14.4%), remained fairly stable – with a slight decreasing tendency – over time, and nearly converged with those of the low/stable groups by the end of the study period. Males comprised the majority of this group (58.7%). White youths were somewhat over-represented in this group (87%), and African Americans were somewhat under-represented (9.0%). The moderate/stable BDP risk group was, on average, older at baseline (M = 14.8) relative to the full sample. The average Wave I SES score was 41.9, and average PBLA at baseline was 3.9. Average offending scores for this group (see Table 9) were somewhat higher than those of the full sample in Waves I to IV, but equal to or somewhat lower in the final three waves.

Low/increasing/decreasing (B) (Output group 6). BDP risk levels followed a somewhat similar pattern in two groups: low at baseline, increasing for a time, then decreasing (see Figure 4). The timing of the changes distinguished the groups. In the group described here, which made up 5.2% of the sample (n = 64), the increase in risk level commenced at the beginning of the study period, when the average age was 13.8 years, and continued until about age 18, when risk began to decrease. (In contrast, in the group described below, the increase in risk was more gradual, and risk reached a peak at about age 21.) Males were in the majority in this group

(77.8%). The proportion of white youths in the group was similar to that of the full sample (81.3%), and the group included a slightly lower proportion of African Americans (9.4%) and a higher proportion of other youths of color (9.2%, compared with 4.7%), relative to the full sample. The average age of the low/increasing/decreasing (B) group was 13.6, average SES was 45.2, and average PBLA was 3.7. As shown in Table 9, the average offending score at Wave I for this group was somewhat higher that that of the full sample, and, in contrast to the overall trend in offending over time, offending scores increased over Waves II and III for this group. Offending scores began to decrease at Wave IV, but remained higher at all waves, relative to those of the full sample.

Low/increasing/decreasing (A) (Output group 5). BDP risk levels followed a pattern similar to that just described in a second group (n = 54, 4.4%). However, as noted, the current low/increasing/decreasing (A) group was distinguished by a gradual increase in risk in early waves, and a later peak in offending (see Figure 4). This group was largely male (75.9%). African American youths were somewhat over-represented in this group relative to the full sample (18.5.%), and white youths were somewhat under-represented (77.8%). This group was younger at Wave I (M = 12.3) relative to the full sample, with slightly lower average scores on SES (i.e., a higher level of SES; M = 49.1), and similar PBLA scores (M = 3.8). As shown in Table 9, offending scores were somewhat higher at baseline for members of this group. Scores remained fairly stable, with a slight decrease, until Wave VI, when they increased. At Wave VII, offending scores had decreased, but these scores were higher than those of the full sample at all waves.

High/decreasing (Output group 4). The initial risk level on bonding with delinquent peers was quite high for this group, which made up 4.2% (n = 52) of the sample. However, the level of

risk decreased steadily over the entire study period, ending near those of the moderate/stable group (see Figure 4). The high/decreasing BDP risk group was largely male (73%), with slightly higher proportions of white youths (84.6%) and African American youths (15.4%) relative to the full sample. No youths of other racial/ethnic backgrounds were included in the group. The group was older at baseline (M = 14.9) relative to the full sample, but scores on SES (M = 43.9) and BPLA (M = 3.8) were similar to those of the full sample. Offending scores were higher for the high/decreasing BDP risk group, relative to those of the full sample, during the first four waves, but more similar to those in the full sample at Waves V to VII (see Table 9).

High/slight increase/decrease (Output group 7). Finally, one small group (n = 18, 1.5%) was distinguished by an initially high BDP risk level that increased slightly until about age 17, when it began a gradual decrease. Risk for this group remained higher than that of all other groups over the entire study period. Males made up 77.8% of this group, white youths made up 72.2% of the group, and African American youths 16.7%. The average age of the high/slight increase/decrease group was 14.3 years, average SES was 45.4 (i.e., indicating slightly lower SES than the full sample average), and average PBLA was 3.8. This group consistently displayed higher levels of offending relative to the full sample and relative to all other groups at every wave, as shown in Table 9. The level of offending changed in a manner that was parallel to the change in BDP risk level over time.

Comparisons across groups. Table 9 provides descriptive statistics on the summed and undichotomized measure of aggression, at each Wave, for the seven BDP risk trajectory groups. Analyses of variance yielded a significant group effect at each Wave. Pairwise comparisons yielded results indicating a possible link between risks associated with bonding with delinquent peers and offending over time. For example, offending scores were significantly higher at every

wave on each pairwise comparison between the smallest BDP risk group – high/slight increase/decrease – and every other group. The pattern of differences between the high/decreasing group with other groups is also instructive. At the first wave, the average score on offending for this group (with a high baseline BDP risk level), was significantly higher than the average offending score of each of the five groups for which baseline risk was lower. At Wave II, the group's average on offending was significantly higher than the lower-risk groups, with the exception of the group in which risk was initially low but increased during the early study period (i.e., the low/increasing/decreasing (B) group). Note in Figure 4 that the gap between risk levels for the two groups at Wave II had narrowed. At Wave III the risk trajectories of these groups crossed, and the mean difference on offending was equal to .04 (on a measure that ranged from 1 to 3). By Wave IV, the average offending score for the high/decreasing group was significantly *lower* than that of the high/slight increase/decrease group and no longer significantly different than the average in the second group in which BDP risk was initially low but underwent a gradual increase (i.e., the low/increasing/decreasing (A) group). At Wave V, the average of the high/decreasing BDP risk group remained significantly lower that that of the higher risk group. It was significantly higher than the average in only one group – the low/stable (B) group – which had the lowest levels of risk at each wave. Similar results obtained at Wave VI. By Wave VII, the average offending score in the high/decreasing BDP risk group was no longer significantly higher than the average of any other group. Its average remained significantly lower relative to the high/slight increase/decreasing BDP risk group. Also reported in Table 9, the model R^2 for each wave indicates that BDP trajectory group membership accounted for a significant proportion of the variance in offending. Values ranged from .06 to .24, with larger values emerging from models for the earlier and middle waves.

Summary. Change over time in the level of bonding with delinquent peers followed seven distinct trajectories using data from seven waves of the NYS. The three largest groups evidenced a somewhat similar pattern of relatively low or moderate, and stable, risk over time. Risk was initially low for two groups, increased for a time, and subsequently decreased, with the timing of the changes distinguishing the two groups. Risk was initially high in two small groups; it decreased steadily in one of these and remained fairly high, with some change over time, in the other. Males appeared to be somewhat over-represented in groups with higher levels of risk, but no pattern emerged with respect to other demographics. Of note, absolute risk levels, as well as change in risk over time, appeared to correspond to offending levels. BDP trajectory group membership accounted for a significant and substantial proportion of the variance in offending at each wave, but this effect decreased in the later waves.

Involvement in Conventional Activities

In the full sample, the average level of involvement in conventional activities (ICA) remained stable over Waves I to VII (see Table 3). As noted earlier, this variable was coded as a risk factor, thus higher scores reflected higher levels of risk (i.e., lack of involvement in conventional activities). Results of analyses using PROC TRAJ (Jones et al., 2001) indicated that a seven-group model provided the best fit to the data (BIC = -5358). The seven ICA risk trajectories appear in Figure 5. Table 10 shows the average estimated probabilities of membership in each group across trajectory groups. It should be noted that these probabilities suggest a possible overlap in groups, despite the fact that the seven-group ICA model had the highest BIC. Characteristics of trajectory groups are presented below in order of decreasing size; descriptive statistics on the summed undichotomized measure of offending at each wave for each ICA risk group appear in Table 11.

Figure 5 about here

Table 10 about here

Table 11 about here

Moderate/stable (Output group 4). The largest risk trajectory group related to involvement in conventional activities (ICA) had an average score in the midrange at Wave I (*n* = 337, 27.5%). Scores on ICA were fairly stable over time for this group, which was 52.3% male, 84.9% white (compared to 81.4% of the full sample), and 11% African American (13.9% in the full sample). Average age at Wave I in this group was 13.5 years (compared with 13.8 for the full sample), the average PBLA score was 3.8 (similar to the full sample), and the average SES at baseline was 41.0 (compared with an average of 43.0 in the full sample). As shown in Table 11, average offending scores were slightly lower relative to those of the full sample at all waves.

Moderate-high/slight decrease (Output group 5). Average ICA scores at Wave I were moderately high for this group, and scores decreased only slightly over time. The group comprised 21.0% of the sample (*n* = 258). Males made up the majority of this group (59.3%), and the group closely matched the full sample on race/ethnicity (80.2% white and 14.3% African American). Averages on age (*M* = 14.0) and the SES measure (*M* = 44.7) were somewhat higher relative to the full sample. The mean score on parental beliefs legitimizing aggression was 3.8, similar to the full sample. Offending scores for this group were slightly above those of the full sample at each wave (see Table 11).

Moderate/increasing (Output group 6). ICA score at baseline were comparable to that in the largest group (see above) for this group, but in contrast to the former group, ICA risk levels increased noticeably for youths in this group, until about age 20, when scores leveled and then

fell slightly. This group made up 12.8% of the sample (*n* = 147). Females comprised 68.2% of this group, and African Americans were somewhat over-represented in the group (18%, compared to 13.4% in the full sample). Youths in this group were somewhat older at baseline (*M* = 14.3), had lower level of SES (*M* = 40.1), and had similar PBLA scores, relative to members of the full sample. As shown in Table 11, offending scores for this group closely mirrored those of the full sample in Waves I to VII.

Low/increasing (Output group 3). ICA scores at baseline were low for this group (*n* = 147, 12.0%), but risk levels increased steadily over the entire study period. This group was predominantly female (61.2%), and African Americans were somewhat over-represented relative to their numbers in the full sample (15.7% here, versus 13.9%). Average age, SES, and PBLA were quite similar to the averages on these variables in the sample as a whole. Offending scores for this group were also similar to those of the full sample (see Table 11).

Moderate/decreasing (Output group 2). Members of this group had an average ICA score at baseline that was close to averages in two groups previously presented (see Figure 5). This group made up 9.7% of the sample (*n* = 119). Risk levels remained fairly stable for this group until about age 18, when they began to decrease. This group was 57.1% male, 74.6% white (compared to 81.4% in the full sample), and 16.1% African American (compared to 13.9% in the full sample). Average age was lower for this group, relative to the sample as a whole (*M* = 12.8), and average SES was also lower (i.e., a higher level of SES; *M* = 37.8). PBLA scores were similar. Scores on offending at all waves were slightly below the averages for the full sample (see Table 11).

High/slight decrease (Output group 7). As shown in Figure 5, average ICA risk scores were highest at baseline for this group, which made up 9.1% of the sample (*n* = 111). Risk levels were

fairly stable with a slight tendency to decrease over time. The majority of this group was female (54.1%), and white youths were somewhat over-represented in the group (87.4%). This group was older at baseline (M = 15.0), had higher SES scores (i.e., a lower level of SES; M = 49.7), and comparable PBLA scores relative to the full sample. As shown in Table 11, offending scores for this group were somewhat higher relative to the full sample although the magnitude of the difference was smaller in later waves.

Low/stable (Output group 1). The smallest trajectory group identified in this model had low levels of ICA risk at Wave I, and ICA scores remained largely stable over the study period (albeit with a slight decrease earlier, followed by a slight increase). This group included 98 sample members (8.0%). The low/stable group included a slight majority of males (55%), and African Americans were somewhat over-represented in the group (17.4%). Average age at Wave I was 12.8, average SES was 38.3, and average PBLA was 3.8. Average offending scores were only slightly lower than those in the full sample at each wave (see Table 11).

Comparisons across groups. Analyses of variance at each wave, with the summed offending score as the outcome variable and group membership as the predictor, provided information about differences among the ICA trajectory groups. Models were nonsignificant at Waves V and VI, and no pairwise comparisons were significant at Wave IV. At other waves, offending levels for the high/slight decrease ICA risk group were significantly greater than those of a number of other groups (e.g., moderate/stable at Waves I, II, III, and VII; moderate decreasing at Waves I, II, and III; low/stable at Waves II and III). However, these results did not suggest a pattern of consistent positive association between ICA risk and aggression. The model R^2 at two waves was nonsignificant, and it was less than or equal to .03 at the other waves, suggesting, at most, a small effect of ICA trajectory group membership on offending.

Summary. Results of fitting trajectory models to the NYS data revealed seven distinct patterns of ICA risk over time. Risk levels did not appear to be strongly associated with offending levels in the sample. Of note, several groups where risk was high during at least part of the study period were predominantly female.

Summary of Risk Trajectories

Trajectory models provided evidence of seven distinct patterns of change in risk over time in each of the three risk domains examined: beliefs legitimizing aggression (BLA), bonding with delinquent peers (BDP), and involvement in convention activities (ICA – coded as a risk factors with higher scores indicating higher risk). For each risk domain, at least one low/stable group emerged. Groups in which risk was low and relatively stable, or moderate at baseline and decreasing, comprised the majority of the sample for BLA and BDP. There was also at least one group, for each domain, in which risk was considerably higher at the beginning of the study period relative to the other trajectory groups in that domain. Risk levels were fairly stable (albeit with some changes) in the high-risk groups for BDP and ICA, but risk decreased steadily for the high-risk BLA group (but it remained higher than that of other BLA risk groups). Additionally, the trajectory models revealed at least one group in each domain in which risk levels increased over a portion of the study period. Males were over-represented in the BLA and BDP high-risk groups, but females were more prevalent in ICA high-risk groups. Finally, offending levels appeared to be associated with risk levels, and changes in risk over time, for the BLA and BDP domains, but not for the ICA domain.

Findings III: Dual Trajectories

Dual trajectory models (Nagin & Tremblay, 2001) for offending and risk were fit using the TRAJ procedure in the SAS system software (Jones et al., 2001). First, we fit a dual

trajectory of violent offending with beliefs legitimizing aggression (BLA). The second dual trajectory model included violent offending with bonding with delinquent peers (BDP). The final dual trajectory model was fit with violent offending and involvement in conventional activities (ICA). The five-group logit model described earlier, with violent offending dichotomized at the 90th percentile, was included in all dual trajectory analyses. However, using the seven-group risk models described earlier proved problematic in the dual trajectory models, presumably due to the large number of combinations of groups (i.e., seven risk groups by five offending groups, yielding 35 offending-risk combinations). These models either failed to converge, or, alternatively, resulted in an error message indicating the procedure was unable to calculate estimated standard errors. Thus, there was a need to use, for a particular risk factor, a model that included fewer than seven risk trajectories. Reinspection of the risk models presented earlier indicated that each model included, potentially, overlapping or redundant risk trajectories using the maximum BIC as the standard for determining the optimal number of groups.

We refit four-, five-, and six-group models for each risk factor and selected, for each, a model for use in dual trajectory models. Distinctiveness of risk trajectories and the BIC of competing models guided model selection. For example, a four-group BLA risk model yielded a BIC of -7081, a five-group model yielded a BIC of -7037, and a six-group model yielded a BIC of -7011. Clearly, a six-group model was indicated based solely on the BIC. However, we selected the four-group model for use in the dual model with violent offending, based on visual inspection of the graphs and based on a preference for fewer, rather than more, groups. The four-group model is shown in Figure 6. The five- and six-group models resembled this model closely in that each model included low-stable, moderate-stable, and moderate-decrease groups. In contrast, the five- and six-group models also included, respectively, two or three groups for

which risk was initially high but decreased over time. These trajectories were distinguished by the rate with which risk fell over time, but each could be termed "high-decrease." It should be noted that each trajectory in the four-group model also appeared in the seven-group model described earlier (see Figure 3).

Marginal Probabilities in the Dual Models

Before presenting the results of the dual models, a word about marginal probabilities is in order. As described earlier, in a single trajectory model, the TRAJ procedure provides an estimated probability of membership in each group for each observation. In a "good" model, each observation will have a high probability of membership in one group and a near-zero probability of membership in all other groups. An observation is deemed to "belong" to that group for which his or her probability of membership is highest, relative to all other groups. The probabilities of group membership reported above for the single trajectory models were calculated after model fitting, and they were based on this post hoc assignment of individuals into groups. In other words, the marginal probability distribution of, for example, violent offending group membership, was based on the proportion of observations assigned to a particular offending group. This approach did not take into account the probabilistic nature of the trajectory models, but it was necessary for performing subsequent analyses aimed at making comparisons across trajectory groups.

However, the TRAJ procedure does provide likelihood-based estimates of marginal probabilities of group membership, and these do allow for uncertainty in group membership (B. Jones, personal communication, September 19, 2005). In a single model, these represent a "weighted average" of the probability of membership in a particular group, over all observations. Thus, they do not correspond, precisely, to the probabilities based on post hoc assignment to

groups. In a dual model, the procedure provides likelihood-based estimates of analogous marginal probabilities of group membership. For example, in a dual model of violent offending and BLA risk, the procedure yields estimates of the marginal probability distribution of membership in the violent offending groups and of the marginal probability distribution of membership in the BLA risk groups. Additionally, the software provides estimates of joint and conditional probabilities using a full likelihood approach. In the dual trajectory models described below, we provide the likelihood-based estimates of marginal, conditional, and joint probabilities from each model. Each of these models includes violent offending as the first variable of interest. However, the marginal distribution of the probability of group membership in a particular violent offending group differs somewhat across models, and it differs from that presented earlier for the single trajectory model of offending.

Offending and Beliefs Legitimizing Aggression

Tables 12 and 13 show results of the dual violent offending-BLA risk model with five offending groups and four risk groups. Table 12 provides (a) marginal probabilities of group membership in the violent offending groups; (b) marginal probabilities of group membership in the risk groups; (c) conditional probabilities of offending group membership, given membership in a particular risk group; and (d) conditional probabilities of risk group membership, given membership in a particular offending group. Table 13 shows joint probabilities of membership in a particular offending group and a particular risk group. Conditional and joint probabilities shed light on the dynamic relationship between risk and offending over time.

The first set of conditional probabilities – offending group given risk group – are presented by risk group, and each conditional probability is contrasted with its analogous marginal probability. For example, consider the low/stable BLA risk group. The conditional probability of

being in, say, the early onset/chronic offending group given membership in this risk group is reported and contrasted with the marginal probability of membership in the early onset/chronic offending group. Here, the conditional probability was .008, and the marginal probability was .071 (see Table 12). This provides information about the relative likelihood of being classified in the early onset/chronic offending group for members of the low/stable risk group, compared to the sample as a whole. In this example, the probability of being in the early onset/chronic group was much lower for those in the low/stable BLA risk group, compared with the sample as a whole, suggesting that a low and stable level of BLA risk may be a protective factor against early and chronic violent offending.

In contrast, the second set of conditional probabilities – risk group given offending group – is presented by comparing selected offending groups. Such a comparison sheds light on the risk profiles of selected offending subgroups that differ in some meaningful way. For example, one can compare the conditional probability distribution of risk group membership for the early onset/chronic group and the conditional probability distribution of risk group membership for the early onset/desister group. Another example would be to compare conditional distributions across the three offending groups in which offending was initially low: low/stable offending, adolescent onset offending, and young adult onset offending. Finally, joint probability distributions shown in Table 13 provide information about which risk-offending combinations were most typical (i.e., those with a large joint probability) and which combinations were rare (i.e., those with a small joint probability).

Low/stable BLA risk. The second section of Table 12 (“Conditional Probabilities I”) shows the conditional probabilities of offending group membership given BLA risk group membership. For those classified in the low/stable BLA risk group, the probability of being classified in the

low/stable offending group was equal to .844, that is, higher than the marginal probability of .610 in the full sample. The probability for members of this risk group of being classified in the young adult onset offending group was equal to .121, somewhat lower than the sample marginal of .195. Similarly, the probability for those in the low/stable BLA risk group of being classified in the adolescent onset offending group was .024, compared to the sample marginal of .076. For those classified in the low/stable BLA risk group, the probability of being in either of the early onset offending groups was less than .01, that is, considerably lower than the marginal probabilities for the full sample (early onset/desister – .042; early onset/chronic – .071). Together these results suggest that low BLA risk was associated with lower violent offending in early adolescence. This association appeared to be present over the course of the study, but its magnitude may have diminished in young adulthood.

Moderate/decrease and moderate/stable BLA risk. BLA risk was initially moderate for two groups; it decreased in one and remained stable in the other over time. The conditional probabilities of offending group evidenced many similarities in these two groups (see Table 12). They were also comparable to the marginal probabilities for offending group in the full sample with respect to the low/stable offending group (full sample – .610, moderate/decrease risk – .600, moderate/stable risk – .602) and to the early onset/desister offending group (full sample – .042, moderate/decrease risk – .031; moderate/stable risk – .029). A similar picture emerged with respect to the young adult onset offending group (full sample – .195, moderate/decrease risk – .229, moderate/stable risk – .247); however, the conditional probabilities were somewhat higher than the marginal, especially for the moderate/stable risk group. For both the moderate/decrease and moderate/stable BLA risk groups, the conditional probability of being in the early onset/chronic offending group was lower relative to the sample marginal (full sample – .071,

moderate/decrease risk – .045, moderate/stable risk – .036). Finally, the conditional probability of being in the adolescent onset group for the moderate/stable risk group was equal to the marginal probability in the full sample (.076). In contrast, this conditional probability was .104 for the moderate/decrease risk group. This pattern of results suggests that a moderate level of endorsement of items measuring beliefs legitimizing aggression was not strongly associated with elevated risk of violent offending. In fact, members of this risk group were less likely to be in the early onset/chronic violent offending group relative to the full sample. That the probability of being in the young adult onset offending group was modestly higher for members of these BLA risk groups, relative to the sample as a whole, suggests, perhaps, that any protective effect of moderate levels of beliefs legitimizing aggression (i.e., lack of high levels of the risk factor) were not operative beyond a certain age.

High/decrease BLA risk. The fourth BLA risk group was the high/decrease group. As shown in Table 12, the conditional probability of being in the low/stable offending group for this risk group – for whom risk was high at baseline – was only .134, compared to a sample marginal of .610. In contrast, the conditional probability of being in the early onset/desister offending group was .216 (compared to the sample marginal of .042), and the conditional probability of being in the early onset/chronic offending group was .478 (compared to a sample marginal of .071). This pattern is consistent with relatively high BLA risk having a positive association with violent offending for young adolescents. This effect persisted for some time: for those classified as being in the high/decrease BLA risk group, the probability of being in the adolescent onset group was .127, compared to a sample marginal probability of .076. In contrast, the conditional probability of membership in the young adult onset group, for the high/decrease BLA risk group, was .045, much lower than the sample marginal of .195. Although risk decreased over time for this group,

BLA risk was consistently higher in it, relative to the other BLA risk groups, providing additional evidence that higher BLA risk was not associated with the onset of violent offending in young adulthood.

Comparing across the early onset groups. The third section of Table 12 ("Conditional Probabilities II") shows conditional probabilities of BLA risk group, given offending trajectory group. As described earlier, these probabilities are most informative for making comparisons across selected trajectory groups. For example, comparing the conditional probabilities of BLA risk group membership between the early onset/chronic and early onset/desister groups will, potentially, shed light on whether the risk profiles of the two offender groups differed markedly. With respect to BLA risk, however, it appears that the two groups did not differ in a meaningful way, with the possible exception that the chronic group had a somewhat higher probability of belonging to the high/decrease BLA risk group relative to the desister group (i.e., .611 versus .507). This indicates that BLA risk status did not play a role in desistance from offending for those who were categorized as violent offenders at baseline.

Comparing low-baseline offending groups. A second potentially informative comparison involves the low/stable, adolescent onset, and young adult onset offending groups. Offending was low at baseline for all three; it remained low in one, and increased, at different points, in the other two. Of note, the conditional probability of being in the low/stable BLA risk group was .310 for those in the low/stable offending group, compared with conditional probabilities of .022 for the adolescent onset offending group and .139 for the young adult onset group. In other words, members of the low/stable offending group were more likely to evidence a consistently low level of BLA risk, relative to the adolescent onset and young adult onset groups, although the difference was less marked with respect to the latter group. For those classified as being in

the adolescent onset offending group, the conditional probability of being in the high/decrease BLA risk group was .164, compared to a conditional probability of .022 for the low/stable offending group and .023 for the young adult onset offending group. Thus, those who began offending in adolescence were more likely to evidence a high level of BLA risk compared to those who rarely offended, and compared to those whose offending commenced in young adulthood.

Joint probabilities I: Typical offending-BLA risk combinations. Table 13 shows the joint probability distribution of offending trajectory group and BLA risk trajectory group. These probabilities can be used to identify the most and least typical combinations of risk group and offending group. It should be kept in mind, however, that the magnitude of the marginal probability of a particular risk or offending group positively affected the magnitude of the joint probabilities. Not surprisingly, the highest joint probabilities involved members of the largest offending group, the low/stable group, with an estimated marginal probability in this model of .610. Members of this offending group were distributed across the low/stable BLA risk group (.189), the moderate/decrease BLA risk group (.152), and the moderate/stable BLA risk group (.256). Interestingly, the largest of these was the low/stable offending-moderate/stable risk group, suggesting that moderate levels of BLA risk were not predictive of violent offending. A fourth fairly typical offending-risk combination was the young adult onset offending-moderate/stable BLA risk group, with a joint probability of .105. The moderate/stable group was the largest of the BLA risk trajectory groups, and the young adult onset offending group was the second largest offending group. Thus, group sizes undoubtedly contributed to the magnitude of this joint probability. Substantively, this result suggests, perhaps, that an onset of violent offending in young adulthood occurred irrespective of one's beliefs legitimizing aggression.

Joint probabilities II: Rare offending-BLA risk combinations. Table 13 shows that the joint probability of offending group with risk group was less than .01 for six offending-risk combinations. Of note, three of these "rare" combinations involved the low/stable BLA risk group with a modest (i.e., not especially small) marginal probability of .224. All involved offending groups with high levels of offending either at baseline and/or in adolescence: the early onset/desister group, the early onset/chronic group, and the adolescent onset offending group. These results suggest that a low level of BLA risk was unlikely in the presence of offending at problematic levels during adolescence. It should be noted that, together, the two early onset offending groups made up less than 10 percent of the sample, which undoubtedly contributed to the small joint probabilities. Two rare combinations (i.e., a joint probability less than .01) involved members of the moderate/decrease BLA risk group (marginal probability = .253) and the two early onset offending groups. Here too, the small number of sample members classified into these offending groups played a role in these results. Substantively, these small joint probabilities tend to suggest that there was an initial protective effect of a moderate (as opposed to high) level of BLA risk in early adolescence; however, risk levels decreased over time whereas offending levels decreased for one of these combinations but not for the other, indicating, perhaps, that BLA risk mattered less over time. Finally, the sixth rare offending-risk combination involved the young adult onset risk group and the high/decrease BLA risk group. The small size of this BLA risk group probably played a role here, but the result also suggests that decreasing – but not necessarily low – BLA risk levels failed to have a protective effect on offending in young adulthood.

Summary of BLA risk with offending. In summary, results of the dual trajectory model suggest three conclusions about the relationship between BLA risk and violent offending over

time. First, low, and perhaps moderate, levels of BLA risk were associated with low levels of offending during early adolescence. However, BLA risk level did not appear to play a role in desistance from offending. Second, relatively high – but not moderate – levels of BLA risk were accompanied by a greater probability of being classified as a violent offender. Put another way, moderate levels of beliefs legitimizing aggression may not have been problematic as a risk factor for violent offending; in fact, members of the two moderate BLA risk groups evidenced lower risk of being in the early onset/chronic offending group relative to the full sample. In contrast, this was not true for higher levels of this variable. Finally, any protective effect of low and moderate levels of BLA risk appeared to be less important in later adolescence and young adulthood.

Table 12 about here

Table 13 about here

Figure 6 about here

Offending and Bonding with Delinquent Peers

We fit a dual trajectory model of violent offending and bonding with delinquent peers using the five-group offending model and a four-group BDP model (see Figure 7). The four-group model evidenced trajectory groups that closely resembled trajectories in the seven-group BDP model presented earlier (see Figure 4). Table 14 shows marginal and conditional probability distributions from the dual model, and Table 15 provides the joint probability distributions for the model. Similar to above, the conditional and joint probabilities provide information about the relationship of violent offending and BDP risk over time. Comparing the first row of Table 14 with the first row of Table 12 illustrates how the marginal distribution of offending groups does indeed vary across the different dual trajectory models.

Low/stable BDP risk. The second section of Table 14 ("Conditional Probabilities I") provides the conditional probabilities of membership in a particular offending group, given membership in a particular BDP risk group. The largest BDP risk group in the four-group model was the low/stable group, which comprised 65.1% of the sample. For those categorized as being in the low/stable BDP risk group, the conditional probability of being classified in the low/stable offending group was .822, compared to the sample-wide marginal of .648. Relative to the analogous full sample marginal probability, the conditional probability for this risk group was smaller with respect to the young adult onset offending group (full sample – .099; low/stable BDP risk group – .052), the early onset/desister offending group (full sample – .146; low/stable BDP risk group – .097), the adolescent onset offending group (full sample – .034; low/stable BDP risk group – .018), and the early onset/chronic offending group (full sample – .073; low/stable BDP risk group – .001). This pattern of results indicates that low BDP risk was accompanied by a low level of offending across adolescence and early adulthood. The result concerning the early onset/desister group, by itself, suggests that a low and stable level of bonding with delinquent peers did not increase the likelihood of desistance for early onset offenders. Instead, the opposite was true: members of the low/stable BDP risk group were less likely to be classified as desisters relative to the full sample. However, it should be noted that those classified as low/stable BDP risk were even less likely to be classified as early onset/chronic and that the difference between the conditional and marginal probability of being in the early onset/chronic group (.001 vs. .073) was far larger than the comparable difference for the early onset/desister group (.097 vs. .146). Potentially, these results suggest that a low and stable level of bonding with delinquent peers played some role in desistance for early onset offenders.

Moderate/stable BDP risk. The second largest BDP risk group in the four-group model, the moderate/stable group, made up 26.3% of the sample (see Table 14). Examination of Figure 7 reveals that, although "moderate/stable" seems an accurate way to describe this group, three features of the risk curve warrant attention. First, the baseline level of risk for this group was not all that much higher than that of the low/stable risk group. Second, the risk curve for this group demonstrated a slight upward trend up to about age 18. Finally, this curve crossed that of the high/decrease BDP risk curve prior to age 21. In contrast to the low/stable BDP risk group, members of this group were less likely to belong to the low/stable offending group (conditional probability = .385), compared to members of the full sample (.648). Instead, those categorized in this risk group were distributed across the other offending groups. The conditional probability of membership in the young adult onset offending group, given moderate/stable BDP risk, was .139, compared to a sample-wide marginal of .099. Similarly, conditional probabilities for members of the moderate/stable BDP risk group were higher, relative to analogous sample marginals, with respect to the early onset/desister offending group (full sample – .146; moderate/stable BDP risk group – .283), the adolescent onset offending group (full sample – .034; moderate/stable BDP risk group – .081), and the early onset/chronic group (full sample – .073; moderate/stable BDP risk group – .111). These results suggest that moderate levels of bonding with delinquent peers were accompanied by an elevated likelihood of violent offending in adolescence and young adulthood. However, the magnitude of the difference between conditional and marginal was smallest with respect to the young adult onset group.

High/decrease BDP risk. The third group in the four-group BDP risk model was the high/decrease group, which comprised 6.8% of the sample (see Table 14). As noted above, the risk curve for this group crossed that of the moderate/stable group prior to age 21 (see Figure 7).

The conditional probability of being in the low/stable offending group was small for this risk group (.167), compared to the sample marginal of .648. For members of the high/decrease BDP risk group, the conditional probability of being in the young adult onset group was .406, much higher than the sample marginal of .099. Interestingly however, risk had declined considerably by the time of onset of offending (around age 18) in this group, and it continued to decline as the probability of being classified as a violent offender increased. The conditional probability of membership in the early onset/desister group (.123) was roughly comparable to the full sample marginal (.146). With respect to the adolescent onset offending group, the conditional probability for the high/decrease BDP risk group was .014, compared to a sample marginal of .034. Finally, the conditional probability of membership in the early onset/chronic offending group given high/decrease BDP risk was .290, versus a full-sample marginal of .073. Thus, there was evidence that a high baseline level of BDP risk was accompanied by early offending, but the fact that risk decreased over time did not appear to influence desistance for early onset offenders, nor escalation in young adults.

High/stable BDP risk. BDP risk was consistently high for a small portion of the sample (1.9%). As shown in Figure 7, risk actually increased slightly for this group until about age 18, at which point it began a slow decrease. Conditional probabilities for this risk group were near zero (and much smaller than marginals) with respect to three offending groups: low/stable offending, early onset/desister offending, and adolescent onset offending. In contrast, the conditional probability of being in the early onset/chronic group was very high, .932, for members of the high/stable BDP risk group, relative to a marginal in the full sample of .073. The conditional was somewhat lower (.068) with respect to the young adult onset offending group, compared to the sample marginal (.099). Clearly, these results suggest that a high and stable level of bonding with

delinquent peers was associated with early onset/chronic violent offending, and that, in the presence of this risk, a low level of offending was highly unlikely. However, the results also suggest that factors other than BDP risk contributed to the onset of offending in early adolescence.

Comparing early onset groups. The second section of Table 14 ("Conditional Probabilities II") shows conditional probabilities of membership in a particular BDP risk group, given membership in a particular violent offending group. Rows 4 and 5 of this section of the table provide the conditional probabilities (i.e., risk profiles) of the early onset/desister and early onset/chronic offending groups. The risk profile of these two offender groups evidenced one approximate similarity: the conditional probability of membership in the moderate/stable BDP risk group was .509 for the desister group and it was .401 for the chronic group. In contrast, desisters were much more likely (.434) to be classified in the low/stable BDP risk group, relative to the chronic group (.092). The opposite was true with respect to the two groups in which BDP risk was initially high – conditional probabilities of membership in these risk groups were higher for the chronic group (high/decrease BDP risk – .269 and high/stable BDP risk – .239) relative to the desister group (high/decrease BDP risk – .057 and high/stable BDP risk – less than .001). These results suggest that desistance was more likely in the presence of a low (but not moderate) and stable level of BDP risk for early onset offenders. Moreover, high levels of BDP risk were unlikely in desisters.

Comparing low-baseline offending groups. Rows 1, 2, and 3 of the third section of Table 14 show the conditional probabilities of risk group membership given offender group membership for the young adult onset, low/stable, and adolescent onset offending groups, respectively. Compared with the young adult onset and adolescent onset offending groups, the conditional

probability of being in the low/stable BDP risk group for members of the low/stable offending group was higher (.826 for the low/stable offending group, compared to .339 for the young adult onset offending group and .348 for the adolescent onset offending group). In contrast, an opposite picture emerged with respect to the conditional probabilities, across the three offending groups, of being in the moderate/stable BDP risk group (.156 for the low/stable offending group, .370 for the young adult onset offending group, and .624 for the adolescent onset group). This suggests that moderate levels of bonding with delinquent peers may have acted as a risk factor for violent offending, especially for younger adolescents, and less so for young adults. The conditional probabilities of being in the high/decrease BDP risk group were small for the low/stable offending group (.018) and for the adolescent onset offending group (.028), but this conditional probability was fairly high for the young adult onset offending group (.278). This suggests that an onset of offending in young adulthood occurred in the presence of high but decreasing BDP risk. Finally, the conditional probabilities of membership in the high/stable BDP risk group were small (.01 or lower) for all three of these offending groups. For the adolescent and young adult onset offending groups, this suggests that factors other than BDP risk levels influenced the onset of violent offending.

Joint offending probabilities I: Common offending-BDP risk combinations. Table 15 shows the estimated joint probabilities from the dual model of violent offending with BDP risk. By far the most common of the 20 possible violent offending/BDP risk combinations was the low/stable offending-low/stable BDP risk combination (joint probability = .535). Next was the low/stable offending-moderate/stable BDP risk combination (joint probability = .101). No other combination evidenced a joint probability greater than .10. Of potential note, the joint probability for the early onset/desister offending-low/stable BDP risk group was .063 and the joint

probability for the early onset/desister offending-moderate stable BDP risk group was .074 (i.e., somewhat large compared to the other joint probabilities from this model). The results for the early onset/desister group suggest that desistance from offending was more likely in the presence of low and moderate BDP risk levels (compared to high risk).

Joint offending probabilities II: Rare offending-BDP risk combinations. Of the 20 offending-BDP risk combinations shown in Table 15, 7 had a joint probability of less than .01. Four of these involved the high/stable BDP risk group, which was quite small, comprising less than two percent of the sample. Not surprisingly, all of the combinations involving this risk group included a group in which offending was low, or decreasing, at some point. Another rare combination was the early onset/desister-high/decrease BDP risk combination (joint probability = .008), a result indicating that decrease in an initially high level of BDP risk was not paralleled by a decrease in offending.

Summary of BDP risk with offending. Results of the dual model of offending with BDP risk suggest several conclusions. First, low – but not necessarily moderate – levels of BDP risk were accompanied by a lower level of violent offending. This differs from the results concerning BLA risk, where low and moderate risk levels were accompanied by low offending rates. This result is perhaps more noteworthy given the relatively small difference in risk levels between the low and moderate groups in this model. Second, a low level of BDP risk distinguished early onset/desisters from early onset/chronics, but there was no evidence that a decrease in an initially high level of BDP risk contributed to desistance for early onset offenders. Third, BDP risk levels appeared to be unrelated to the onset of offending in young adulthood, and, perhaps more tentatively, in adolescence.

Table 14 about here

Table 15 about here

Figure 7 about here

Offending and Involvement in Conventional Activities

We fit a dual trajectory model of violent offending with the risk factor, involvement in conventional activities (ICA), with the latter coded such that higher scores reflected a greater level of risk (i.e., lack of such involvement). The four-group ICA model, shown in Figure 8, was used along with the five-group offending model. Each of the trajectory groups in the four-group model had a counterpart in the seven-group ICA model described earlier (see Figure 5). Table 16 shows marginal and conditional probability distributions from the dual model. Table 17 provides the joint probability distribution from the model. Similar to above, the conditional and joint probabilities provide information about the relationship of violent offending and ICA risk over time. It should be recalled that ICA risk levels were largely unrelated to offending trajectory group in the analyses reported earlier. Additionally, readers should again note that the estimated marginal probability distribution of violent offending from this dual trajectory model differs somewhat from the marginal distribution of offending in the other dual models and from that of the single trajectory model for violent offending.

Offending group given ICA risk group. The conditional probability distributions of offending group given ICA risk group appear in the second section of Table 16 ("Conditional Probabilities I"). Overall, the pattern of results is consistent across the ICA risk groups, and for each risk group, the conditional probability distribution resembles the marginal probability distribution of offending shown in the first row of Table 16. This pattern is consistent with the earlier findings suggesting little if any relationship between ICA risk and violent offending. There are, perhaps, some results that suggest a trend linking ICA risk to violent offending. For

example, the conditional probability of being in the low/stable offending group, given classification in the moderate/decrease ICA risk group, was .823, higher than the analogous marginal probability of .694. Further, the conditional probability of being in the early onset/chronic offending group was highest for the high/stable ICA risk group (.157), and this probability was also higher than the sample marginal of .068.

ICA risk group given offending group. The third section of Table 16 ("Conditional Probabilities II") shows the conditional probability distributions of ICA risk group given violent offending group. A comparison of the two early onset groups indicates modest differences in risk profiles. First, desisters were more likely than those in the chronic group to be in the moderate/decrease ICA risk group (.056 for the former, .020 for the latter) and in the moderate/stable ICA risk group (.571 for the desisters, .337 for the chronic group). The opposite was true with respect to the high/stable ICA risk group (.114 for the desisters, .419 for the chronic group). This pattern of results indicates the possibility that low and moderate ICA risk levels were more likely to be present among early onset offenders who desisted. For two of the three groups in which offending was low at baseline (i.e., low/stable and young adult onset), the risk profiles were notably similar. In contrast, the third such group (i.e., adolescent onset), there were differences. This group was less likely to be in the moderate/decrease (.033) or the low/increase ICA risk groups (.099), relative to the young adult onset group (moderate/decrease ICA risk – .137 and low/increase ICA risk – .250) and to the low/stable offending group (moderate/decrease ICA risk – .149 and low/increase ICA risk – .237). Members of the adolescent onset group were more likely to be classified as being in the high/stable ICA risk group (.529), compared to the other two groups (young adult onset offending – .149 and low/stable offending – .148). This pattern of results suggests that low and moderate levels of

ICA risk were less likely among those who commenced offending in early adolescence, relative to other youth who had a low baseline probability of being classified as a violent offender.

Joint probabilities of offending and ICA risk. Table 17 shows the joint probability distribution of offending group and ICA risk group. Common combinations, with a joint probability of greater than .10, all involve the largest offending group, the low/stable group. The size of each reflects the relative size of the ICA risk group with which the low/stable group is paired (e.g., the most common combination involves the low/stable offending group and the largest ICA risk group, the moderate/stable group, with a joint probability of .323). This pattern is consistent with earlier findings suggesting little if any relationship between offending and ICA risk. Five offending-ICA risk combinations had a joint probability less than .01; however no substantive conclusions are apparent based on these results.

Summary of ICA risk. The dual model of offending with ICA risk suggested a lack of a relationship between the two variables, a finding consistent with earlier results. However, selected conditional probabilities hinted at a possible link between the two although this must be considered highly tentative.

Table 16 about here

Table 17 about here

Figure 8 about here

Findings IV: Analyses of Demographic Subgroups

To gain greater insight into offending, risk, and relationships between offending and risk, we completed a series of analyses for four sample subgroups: African American females (n = 76), African American males (n = 94), white females (n = 509), and white males (n = 488). The first set of subgroup analyses aimed to explore whether patterns of change in offending over

time identified in the full sample could be replicated within each subgroup. This involved fitting offending trajectory models (Jones et al., 2001) for each subgroup separately. The second set of analyses explored whether risk trajectories for the subgroups paralleled those of the full sample. Accordingly, risk trajectory models for each risk domain – beliefs legitimizing aggression (BLA), bonding with delinquent peers (BDP), and involvement in conventional activities (ICA) – were fit for each sample subgroup.

Finally, for each demographic subsample and within each risk domain, the relationship between offending and risk trajectories was explored using analysis of variance models, with the score on the original (i.e., undichotomized) summed offending measure as the outcome variable and risk trajectory subgroup as the predictor. For example, we fit an ANOVA model with offending as the outcome variable and BDP risk trajectory group membership as the predictor variable using the subsample comprising only African American females. Pairwise comparisons were used to examine how offending differed across risk trajectory groups, and model R^2s provided information about the power of risk trajectory membership to explain offending level.

We calculated estimated effect sizes for selected pairwise comparisons to provide additional information about relationships among risk levels and offending. Each effect size (ES) was computed as the mean difference between two groups divided by the larger of the two standard deviations. The focus here was limited to particular pairwise comparisons within subgroups where relationships (as measured by the model R^2) were strongest. Full details of all pairwise comparisons are available from the first author. Descriptive statistics on offending, by subsample-risk trajectory group (e.g., BDP risk groups for African American females), are provided in table format, but only for analyses where risk levels appeared to be associated with offending.

It should be noted that, due to small sample sizes, analyses of the African American female and male subgroups must be regarded as highly exploratory. Moreover, the sizes of these subgroups resulted, in some analyses, in an extremely small number of individuals being classified as members of a particular trajectory group. For example, the model for BLA risk for African American females identified a trajectory in which BLA risk remained high (with some fluctuation) over the study period. However, only three individuals (3.9% of the subgroup sample) were classified as members of this trajectory group. It is reasonable to question whether such a result is worth reporting. We believe it is, but clearly, the small sample size here implies a need to replicate the finding with a larger sample of African American females. Our reasoning follows from the literature on the trajectory methodology, which does not provide clear guidelines for the minimum number or percentage of individuals that should be classified as members of a trajectory group in order for the group to be valid. It should be recalled that the trajectory model provides a probabilistic description of what is likely to be a more complex population-based reality (see e.g., Piquero, 2004). The process of selecting the best trajectory model involves examining the BIC of competing models, but it is also based on a certain amount of subjectivity on the part of the analyst, guided by the aim of identifying meaningfully distinct patterns of change over time. The above mentioned BLA risk trajectory for African American females is, we believe, worth reporting because it displays an interesting difference relative to a similar BLA risk trajectory in the overall sample. Relative to the latter, BLA risk for African American females does not display a noticeable decline over time, that is, the level of risk remains high for this subgroup. Further, although the absolute number of individuals classified as belonging to the group is small, the percentage of the population estimated to be described by this trajectory (i.e., about four percent) is non-negligible.

African American Females

Offending trajectories. Based on the largest BIC criterion, a two-group trajectory model provided the best account of changes in offending over time for African American females (*n* = 76; BIC = -167). The model yielded a *low/stable* offending group (*n* = 64, 84.2%) similar to the model using the full sample (see Figure 9). The offending trajectory of a second group of African American females resembled the *adolescent onset* group (*n* = 12, 15.8%). For this group, the probability of classification as a high offender was initially at about .2, rose to over .5 by age 18, leveled for a time, and subsequently declined to close to baseline level. Thus, although the model for African American females identified fewer trajectories relative to the model for the full sample, the trajectories that were present for this subgroup resembled ones from the full sample model.

Figure 9 about here

BLA risk trajectories. As shown in Figure 10, the best model (BIC = -479) identified four distinct patterns of change over time for the risk factor, beliefs legitimizing aggression (BLA), using the subsample of African American females. In decreasing order of size, these trajectories were termed (a) *moderate/stable* (*n* = 42, 55.3%); (b) *low/decreasing* (*n* = 22, 28.9%); (c) *high/decreasing* (*n* = 9, 11.8%); and (d) *high/slight increase/slight decrease* (*n* = 3, 3.9%). Comparison of Figure 10 with Figure 3 suggests that the four trajectory groups identified for African American females each had a counterpart in the model using the full sample, although as noted earlier, some differences emerged as well. Table 18 provides descriptive statistics on offending for the risk group subgroups at each wave. Analysis of variance models at each wave, with (four-level) trajectory group membership as the predictor variable and offending as the outcome variable revealed a significant group effect at each wave except Wave VII. Pairwise

comparisons indicated that risk was positively associated with offending, especially during early waves. At Wave I, the high/decreasing BLA risk group had the highest risk level. Offending for this group was significantly higher relative to the low/decreasing (ES = .71) and moderate/stable groups (.67). No other pairwise comparisons were significant at this wave (R^2 = .17). At Wave II, risk for the high/decreasing group had fallen considerably, whereas risk in the high/slight increase/slight decrease group had risen. The average offending score for members of the latter group were significantly higher, relative to the low/decreasing group (ES = 3.5). Other pairwise comparisons were nonsignificant (R^2 = .11). The model for Wave III was significant (R^2 = .14); however, pairwise comparisons were all nonsignificant, perhaps due, in part, to the extremely small *n* of the highest risk group. At Wave IV, the average offending score of the high risk group was significantly greater than those of the low/decreasing (ES = .51) and moderate/stable groups (ES = .47), but not that of the high/decreasing group, for whom risk levels had fallen below those of the moderate/stable group (R^2 = .14). The same set of results obtained at Wave V (R^2 = .11, ESs = .91 and .93). At Wave VI (R^2 = .11), the offending score of the high risk group was significantly greater than the average scores of the other three groups (ESs ranged from .79 to .95). When interpreting the effect sizes, it is useful to keep in mind that the standard deviations used in their calculation fluctuated considerably across waves and subgroups, due in part to the small sizes of the subsamples. These fluctuations, in turn, influenced effect sizes (see Table 18).

Figure 10 about here

Table 18 about here

BDP risk trajectories. A three-group trajectory model for bonding with delinquent peers (BDP) provided the best fit to the data for African American females (BIC = -2190). As depicted in Figure 11, the largest group (*n* = 42, 55.2%) followed a *low/stable* pattern of BDP risk over

time. The next largest group (termed *moderate/stable, n* = 31, 40.1%) followed a similar pattern, with somewhat higher levels of risk. Finally, a *high/slight decrease* trajectory described change in BDP risk for a small group of three (3.9%). Similar to other models for African American females, these trajectories closely resembled ones from the full-sample model. Analyses of variance indicated that risk trajectory group membership was a significant predictor of offending at Wave II only, when offending levels differed significantly between the low/stable and high/slight decrease group (R^2 = .16). Thus, there was little evidence of a positive association between BDP risk and offending for African American females.

Figure 11 about here

ICA risk trajectories. The best-BIC model (BIC = -382) for the risk domain, involvement in conventional activities (coded as a risk factor with higher scores indicating higher risk), revealed three trajectory groups: (a) *moderate/stable* (*n* = 48, 63.2%); (b) *low/increasing* (*n* = 19, 25%); and (c) *moderate/increasing* (*n* = 9, 11.8%) – see Figure 12. Similar trajectories of ICA risk appear in Figure 5 for the full sample. Analyses of variance with ICA risk trajectory membership predicting offending were nonsignificant results at each Wave, indicating a lack of association between this risk factor and offending.

Figure 12 about here

African American females: Summary. Exploratory analyses using this relatively small subsample (*n* = 76) of African American females indicated that patterns of offending over time for the group resembled those found for the overall sample of youths. However, the best model identified only two trajectory groups, compared to five distinct groups for the full sample. In a similar fashion, risk models identified fewer – but similarly shaped – trajectories that depicted change in risk levels over time for the group. There was evidence that the risk factor, beliefs

legitimizing aggression, was positively associated with offending for African American females, and that this association persisted until Wave VI of data collection (but not Wave VII).

African American Males.

Offending trajectories. Similar to their female counterparts, a two-group model depicting offending over time provided the best fit to the data for African American males (BIC = -321). Shown in Figure 13, the model identified a *low/stable* trajectory group (*n* = 63, 67.0%) and an *adolescent onset* trajectory group (*n* = 31, 33.0%). In contrast to the African American female adolescent onset group, the probability of classification as a violent offender for the male adolescent onset group did not display a decrease in later waves (i.e., no peak occurred in adolescence).

Figure 13 about here

BLA risk trajectories. Results of the TRAJ procedure indicated there were two distinct trajectories that described how the risk factor, beliefs legitimizing aggression (BLA), changed over time for African American males: a *low/decreasing* trajectory (*n* = 86, 91.5%) and *high/decreasing* trajectory (*n* = 8, 8.5%), as shown in Figure 14. These trajectories resembled ones from the model using data from the full sample. Analysis of variance models fit at each wave indicated no significant effect of BLA risk trajectory group membership on offending levels.

Figure 14 about here

BDP risk trajectories. Three trajectory groups for the risk factor, bonding with delinquent peers (BDP), were identified in the best model using data on African American males (BIC = -2847). Shown in Figure 15, the trajectories were similar to ones from the full-sample model: (a) *low/stable* (*n* = 73, 77.7%); (b) *moderate/stable* (*n* = 19, 20.2%); and (c)

moderate/increasing /decreasing (*n* = 2, 2.1%). Of note, the model did not identify a trajectory group in which the risk level was initially high for African American males. Table 19 provides descriptive statistics for offending for each of the BDP risk subgroups for this subsample. BDP risk trajectory group membership was a significant predictor of offending levels at all waves. For example, at Wave I, the average offending score of moderate/stable group was significantly greater than that of the low/stable group (R^2 = .08, ES = .60). The mean offending difference score between the low/stable and moderate/increasing/decreasing was of equal magnitude, but this difference was not significant presumably due the small size of the latter group. Pairwise comparisons of offending across the three BDP risk trajectory groups were all significant at Wave II (R^2 = .25) with effect sizes of .50 (low/stable versus moderate/stable), 1.78 (low/stable versus moderate/increasing/stable), and 1.4 (moderate/stable versus moderate/increasing/stable); Wave III (R^2 = .29, ESs = .87, 1.62, and 1.21); and Wave IV (R^2 = .22, ESs = .64, .61, and .41). In each comparison, the average offending score was higher in the trajectory group in which risk was higher. At Wave V, a similar pattern was apparent, but the pairwise comparison of the low/stable and moderate/stable groups was no longer significant (R^2 = .32, ESs = .78 and .67); these results were replicated at Wave VI (R^2 = .29, ESs = 1.13 and 1.04). At Wave VII, when risk level for the higher-risk group had decreased, only the difference in offending between this group and the low/stable group was significant (R^2 = .08, ES = 1.20). In summary, these results suggest a consistent and positive association between BDP risk trajectory group membership that extended into young adulthood, for African American males. The association existed as risk increased and decreased. Although the results are intriguing, the small size of the African American male subsample, and especially of the moderate/increasing/decreasing group (*n* = 2), must be kept in mind.

Figure 15 about here

Table 19 about here

ICA risk trajectories. The best model (BIC = -556) for African American males identified three distinct trajectories of the risk factor, involvement in conventional activities (ICA – see Figure 16). With counterparts in the full-sample model, the trajectory groups for this subsample were: (a) *moderate/slight increase/slight decrease* (*n* = 64, 68.1%); *low/decreasing/increasing* (*n* = 22, 23.4%); and (c) *high/decreasing* (*n* = 8, 8.5%). With the exception of a single pairwise comparison (between groups a and c at Wave II), there was no significant effect of ICA risk trajectory group membership on offending.

Figure 16 about here

African American males: Summary. Results presented here suggested that trajectories of risk and offending for African American males resembled ones found in the models using data from the full sample. However, all models for this subgroup identified fewer distinct patterns of change over time, relative to the full-sample models. In contrast to the results for African American females, there was no evidence of an association between BLA risk and offending for African American males. Instead, there was evidence of an association between BDP risk and offending for this group. Similar to their female counterparts, there was no evidence of a relationship between ICA risk and offending for African American males.

White Females

Offending trajectories. Figure 17 shows three trajectories of violent offending for white females (*n* = 509), based on the best trajectory model (BIC = -718). Although fewer than five trajectories were identified for this group, the trajectories that were identified resembled ones in the best model using data on the entire sample (compare Figure 17 with Figure 2). The three

offending trajectories for white females were (a) *low/stable* (*n* = 413, 81.1%); (b) *young adult onset* (*n* = 47, 9.2%); and (c) *adolescent onset* (*n* = 49, 9.6%). In contrast to the full sample, the two early onset groups (chronic and desister) were not apparent for white females.

Figure 17 about here

BLA risk trajectories. The best model (BIC = -2859) for white females of the risk factor, beliefs legitimizing aggression (BLA), identified four distinct trajectories (see Figure 18): (a) *low/decreasing* (*n* = 227, 44.6%); (b) *moderate/decreasing* (*n* = 151, 29.7%); (c) *moderate/slight increase* (*n* = 99, 19.4%); and (d) *high/decreasing* (*n* = 32, 6.3%). Table 20 shows descriptive statistics for offending for each BLA risk trajectory subgroup for white females. Analyses of variance indicated a significant effect of BLA risk trajectory group membership on offending score at each wave except Wave VII. At Wave I, average offending was significantly higher in the high/decreasing group relative to all the other groups, with effect sizes ranging from .52 to .82. In addition, the offending mean in the moderate/decreasing group was significantly higher than that of the low/decreasing group (ES = .36). Model R^2 at Wave I was .10. The identical pattern of results was present at Wave II (R^2 = .08), Wave III (R^2 = .08), and Wave V (R^2 = .06). Effect sizes decreased somewhat over time (e.g., from .36 to .27 for the low/decreasing versus moderate/decreasing comparison, and from .82 to .53 for the low/decreasing versus high/decreasing comparison). At Wave IV, the pairwise comparisons between the high/decreasing group and all other groups were significant (R^2 = .09, ESs ranged from .42 to .53). Finally, at Wave VI, the differences between the high/decreasing group and the moderate/decreasing (ES = .28) and low/decreasing groups (ES = .33) were significant, but the difference in mean offending levels between the high/decreasing and moderate/slight increase groups were no longer significant (R^2 = .03). This pattern of results provides modest evidence

that BLA acts as a risk factor for offending at least through the end of adolescence for white females. It should be noted, however, that the differences in risk levels at Wave VII between (a) the high/decreasing group and (b) the low/decreasing and moderate/decreasing groups were similar in magnitude to differences in risk between (c) the moderate/slight increase group and (d) the low/decreasing and moderate/decreasing groups. However, offending levels were not significantly different in the latter pairs of groups (e.g., low/stable versus moderate/slight increase), whereas these were different for the former pairs (e.g., low/stable versus high/decreasing). Additionally, trajectory group membership accounted for a relatively modest proportion of the variance in offending levels.

Figure 18 about here

Table 20 about here

BDP risk trajectories. Selection of the best trajectory model for the risk factor, bonding with delinquent peers (BDP), for white females required us to consider various criteria in addition to the BIC. A seven-group model yielded the highest BIC (-16,592). However, this model, along with the six-, five-, and four-group models, identified multiple nearly redundant trajectories, as well as trajectory groups that included fewer than one half of one percent of the sample. In contrast, the three-group model shown in Figure 19, though characterized by a BIC equal to -16,851, identified three clearly distinct trajectories: (a) *low/slight increase* (*n* = 392, 77.01%); (b) *moderate/slight decrease* (*n* = 106, 20.8%); and (c) *moderate/increasing/ decreasing* (*n* = 11, 2.2%). The size of the third trajectory group from this model was small, to be sure. However, a trajectory of this shape, in which BDP risk was at a fairly high level during middle and late adolescence, appeared in every model, including a two-group model. Thus it appears to be a reasonable depiction of how this risk factor varied over time for a small

subsample of white females. Descriptive statistics on offending for the three BDP risk trajectory groups for white females appear in Table 21. Results of the analyses of variance revealed a significant effect of BDP risk trajectory group membership at every wave. Pairwise comparisons indicated that the average level of offending in the moderate/increasing/decreasing was significantly greater than average offending of both the other groups at each wave. Effect sizes of the comparison of the moderate/increasing/decreasing group with the low/stable group were .88 (Wave I), 1.32 (Wave II), .94 (Wave III), 1.12 (Wave IV), 1.07 (Wave V), .77 (Wave VI), and .52 Wave VII). Effect sizes of the comparison of the moderate/increasing/decreasing group with the moderate/slight decrease group were .56 (Wave I), 1.14 (Wave II), .79 (Wave III), 1.05 (Wave IV), 1.04 (Wave V), .69 (Wave VI), and .46 Wave VII). Average offending was also significantly greater in the moderate/slight decrease group, relative to the low/slight increase group in the first four waves (ESs ranged from .23 to .45). As risk levels for these two groups converged in Waves V, VI, and VII, however, offending differences were no longer significant. BDP risk trajectory group membership accounted for a significant, and, especially in the middle waves when differences on risk were highest, fairly substantial proportion of the variance in offending as estimated by the model R^2s: Wave I (R^2 = .10); Wave II (R^2 = .20); Wave III (R^2 = .18); Wave IV (R^2 = .30); Wave IV (R^2 = .30); Wave V (R^2 = .31); Wave VI (R^2 = .09); Wave II (R^2 = .08).

Figure 19 about here

Table 21 about here

ICA risk trajectories. Six distinct trajectories of risk related to the lack of involvement in conventional activities (ICA) were identified in the best model (BIC = -2205). Shown in Figure 20, the six ICA trajectories were: (a) *low/increasing* (*n* = 35, 6.9%); (b) *moderate/slight decrease*

(*n* = 87, 17.1%); (c) *low-moderate/increasing* (*n* = 115, 22.6%); (d) *moderate/slight decrease/ increase* (*n* = 130, 25.5%); (e) *moderate/increasing* (*n* = 90, 17.7%); and (f) *high/stable* (*n* = 52, 10.2%). The effect of ICA risk trajectory group membership on offending was nonsignificant at Waves II and VI, and it was modestly significant at the other waves – although all pairwise comparisons were nonsignificant at Wave VII. At other waves, results of pairwise comparisons provided little clear insight into the nature of the – probably quite weak – relationship between ICA risk and offending. For example, the average offending score of the high/stable group was significantly greater than the average offending score of only one other group – the moderate/slight decrease group – and only at Wave I. No other pairwise comparisons involving the high/stable group were significant, although risk remained high for this group over the entire study period. The average of offending for the moderate/increasing group was significantly greater than the averages of the moderate/slight decrease group at Waves I (at which point, it should be noted, ICA risk levels were quite similar – see Figure 20), III, IV, and V; and it was greater than the mean on offending of the moderate/increasing group at Waves I and III. No pairwise comparisons involving the low/increasing group were significant. Model R^2s were small, .05 at Wave I, but less than .02 at other Waves where there was a significant effect of ICA group membership on offending.

Figure 20 about here

White females: Summary. The best model identified three distinct trajectories of violent offending for white females, and these corresponded to the low/stable, adolescent onset, and young adult onset trajectories for the full sample. There was no evidence of early onset offending trajectories for this subgroup of youths. Analyses suggested that risk trajectories related to beliefs legitimizing aggression, and even more so, bonding with delinquent peers, were related to higher

probabilities of being classified as a violent offender for white females. Risk related to lack of involvement in conventional activities was not associated with offending.

White Males

Offending trajectories. Three distinct trajectories of violent offending emerged from the best model (BIC = -1447) for white males (*n* = 488). The three trajectories, shown in Figure 21, corresponded to ones from the full-sample model: (a) *low/stable* (*n* = 345, 70.1%); (b) *adolescent onset* (*n* = 94, 19.3%); and (c) *early onset/chronic* (*n* = 49, 10.0%). The probability of classification as a violent offender for the adolescent onset group remained fairly stable into early adulthood. For the early onset group, this probability showed a modest decrease over time.

Figure 21 about here

BLA risk trajectories. A six-group model of trajectories of risk related to beliefs legitimizing aggression (BLA) provided the best fit to the data for white males (BIC = -2863). Figure 22 depicts the six BLA trajectories: (a) *low/stable* (*n* = 84, 17.2%); (b) *moderate/ decreasing* (*n* = 58, 11.9%); (c) *moderate-high/decreasing* (*n* = 71, 14.5%); (d) *moderate/stable* (*n* = 228, 46.7%); (e) *moderate/increasing/decreasing* (*n* = 27, 5.5%); (f) *high/decreasing* (*n* = 20, 4.1%). Table 22 provides descriptive statistics on offending for each BLA risk trajectory group for white males. Analyses of variance yielded a significant effect of BLA trajectory group membership on offending at each Wave, and pairwise comparisons indicated, with exceptions, that higher levels of risk were associated with higher levels of offending. For example, the average offending score of the high/decreasing group was significantly greater than the average scores in all the other groups at Wave I, when risk was highest for this group. Effect sizes for these comparisons ranged from 1.19 (with the low/stable group) to .76 (with the moderate/increasing/decreasing group). Risk decreased over the next several waves for this

group but increased for the moderate/increasing/decreasing group over the same period. At Wave II, offending was not significantly different between these two groups; however, at Wave III, the average offending score of the high/decreasing group was significantly greater than that of the moderate/increasing/decreasing group (ES = .41), although risk levels were much more similar in the two groups. Also indicative of support of a relationship between risk and offending levels were results comparing (a) the low/stable and moderate/stable groups with (b) groups where risk was high at some or all waves. For example, offending in the low/stable group was significantly lower than that of the high/decreasing group at all waves (ESs ranged from 1.19 at Wave I to .49 at Wave VII), and it was significantly lower than that of the moderate/increasing/decreasing group at every wave except Wave VII (ESs increased from .62 at Wave I to .95 at Wave III, then decreased to .51 by Wave VI). Pairwise comparisons involving the moderate/stable group followed a similar pattern. However, offending in this group was not significantly different from the average of the moderate/increasing/decreasing group at baseline – a result supportive of a relationship between BDP risk and offending, because risk levels were similar in the two groups at Wave I. Model R^2s ranged from .16 to .18 at Waves I to IV; this measure was equal to .12 at Wave V, .07 at Wave VI, and .04 at Wave VII.

Figure 22 about here

Table 22 about here

BDP risk trajectories. Similar to trajectory analyses using the sample of white females, attention to criteria in addition to the BIC led to the selection of the best model for white males. A seven-group model yielded the maximum BIC (-16,175), but the five-group model (BIC = -16,228) identified distinct trajectories that included reasonable proportions of the subsample of white males. See Figure 23 for a depiction of the five trajectories of risk related to bonding with

delinquent peers: (a) *low/stable (A)* (*n* = 208, 42.6%); (b) *low/stable(B)* (*n* = 174, 35.7%); (c) *moderate/decreasing* (*n* = 50, 10.2%); (d) *low/increasing/slight decrease* (*n* = 43, 8.8%); and (e) *high/decreasing* (*n* = 13, 2.6%). To be sure, the two low/stable groups were somewhat redundant, but every model with more than two groups identified these as distinct trajectories of BDP risk over time. Table 23 provides descriptive statistics on offending for each BDP risk trajectory group for white males. There was a significant effect of BDP risk trajectory group membership on offending at every wave, and pairwise comparisons provided, overall, support for a positive relationship between risk and offending. For example, the average score on offending for the low/stable (A) group was significantly lower that the average offending scores in all other groups, with the exception of pairwise comparisons where risk levels did not differ greatly (i.e., with the low/increasing/slight decrease group at Wave I, and with the low/stable (B) and the moderate-high/decreasing groups at Waves VII). Effect sizes of comparisons involving the low/stable (A) group ranged from .36 to 2.4 (with the largest ES resulting from the comparison with the high/decreasing group at Wave I). Offending averages were significantly higher in the high/decreasing group, relative to those of all other groups at all waves, with effect sizes larger than 2 for 3 such comparisons, between 1 and 2 for 10 comparisons, and above .70 for the remaining comparisons. Overall, this pattern of results provides evidence of a positive relationship between BDP risk and offending for white males. However, risk in the high/decreasing group and in the low/increasing/slight decrease group was essentially equal at Wave VII, and so lack of a significant difference on offending might have been expected at this wave. Nonetheless, pairwise comparison on offending revealed a significant difference between the two groups at this wave (ES = .72). Of interest, offending remained fairly stable for the low/increasing/slight decrease group over the entire study period. In contrast, offending levels in

the high/decreasing and moderate/decreasing groups paralleled a general decrease in risk over time. BDP risk trajectory group membership accounted for a significant and, particularly in the early waves, substantial proportion of the variance in offending: Wave I R^2 = . 30; Wave II R^2 = . 28; Wave III R^2 = . 22; Wave IV R^2 = . 23; Wave V R^2 = . 19; Wave VI R^2 = . 16; Wave VII R^2 = . 07.

Figure 23 about here

Table 23 about here

ICA risk trajectories. The best-BIC (-1964) model of risk related to lack of involvement in conventional activities (ICA) identified five distinct trajectories, as shown in Figure 24: (a) *low/decreasing/increasing* (*n* = 24, 4.9%); (b) *low/slight increase* (*n* = 142, 29.1%); (c) *moderate/decreasing* (*n* = 43, 8.8%); (d) *moderate/stable* (*n* = 194, 39.8%); and (c) *high/ decreasing* (*n* = 85, 17.4%). There was little consistent support for a significant relationship between ICA risk and offending. Analyses of variance did reveal a significant effect of ICA trajectory group membership on offending at every wave except Wave VI, and average offending scores were significantly higher for the high/decreasing group at Wave I relative to all other groups, except the low/decreasing/increasing group. However, risk in the latter group was lower than in most other groups. At Waves I, II, III, IV, V, and VII, the average score on offending of the high/decreasing group was significantly greater than the average offending score of the moderate/decreasing group – the only significant pairwise comparison in four models. Although offending was higher in the former group, risk in the latter group was lower than risk in other groups for which comparisons with the high/decreasing group were not significant. There was a tendency in all groups for offending to decrease over time, and the modest elevation of risk in

three groups during a portion of the study period was not accompanied by an increase in offending. The R^2s of the significant models were small, ranging from .01 to .03.

Figure 24 about here

White males: Summary. Three offending trajectories, low/stable, adolescent onset, and early onset/chronic, were identified using data on 488 white males from the NYS sample. In contrast to the full-model sample, there was no evidence of early onset/desister and young adult onset groups for white males. Risk levels on bonding with delinquent peers and beliefs legitimizing aggression appeared to be positively associated with offending levels, and changes in risk often paralleled changes in offending. However, exceptions to these patterns of results did occur. There was little evidence of an association between offending and risk resulting from lack of involvement in conventional activities.

Demographic Subgroups: Summary

Offending. Separate sets of models were fit to identify distinct trajectories of offending and risk for African American females, African American males, white females, and white males. For African American females and males, models identified two offending trajectories, low/stable and adolescent onset. These closely resembled trajectories using data on the entire NYS sample. However, the probability of classification as a violent offender for the adolescent onset group decreased at later waves for African American females – similar to the full-sample model – but not for African American males. Similar trajectories of offending were found for white females, and consistent with the full-sample model, a young adult onset trajectory was evident for this subgroup. The two early onset trajectories from the full-sample model were not evident for white females however. For white males, three trajectories – low/stable, adolescent onset, and early onset/chronic – emerged from the best model. Overall, offending trajectories for

demographic subgroups resembled ones identified for the full sample, although each subgroup-specific model omitted two or more trajectories that were evident using the entire NYS dataset. Of note was the lack of a group of desister in any of the subgroup trajectory models. Proportions of individuals classified into specific trajectory groups were comparable across these analyses, as well as to those in the analyses on the full sample.

BLA risk. The number of trajectories of risk related to beliefs legitimizing aggression (BLA) varied from two (African American males) to six (white males). Sample size variations probably influenced these differences. However, there did appear to be a marked substantive difference in the shapes of trajectories for African American males, relative to African American females, even though the sample sizes of the two groups were comparable (see Figures 7 and 11). In all four demographic subgroup models, the identified trajectories resembled ones in the best model using data on the full sample (but see relevant figures to examine minor variations). In general, BLA risk decreased over time; however, all models identified one or more trajectories in which risk levels were stable, and in some cases, where risk increased for a portion of the study period. For African American females and white males there was one trajectory for each subgroup in which the level of BLA risk remained fairly stable over most of the study period, and in which a trend towards lower risk at later waves was quite modest. Risk levels were positively associated with offending for African American females, white females, and white males, but not for African American males. The pattern of results from analyses examining these relationships suggested that the effects of BLA risk persisted into early adulthood (i.e., Wave VII) for white males, but only through late adolescence (i.e., Wave VI) for white and African American females.

BDP risk. In the full sample, the best model identified seven distinct trajectories of risk related to bonding with delinquent peers (BDP). In contrast, three trajectories each were identified for African American females, African American males, and white females, and five trajectories were identified for white males. Risk followed roughly similar patterns of change over time – low/stable and moderate/stable – in two trajectory groups for African American males and African American females (see Figures 8 and 12). However, the model for each demographic subgroup also included one trajectory in which was relatively higher at baseline. For African American females, risk decreased slightly over much of the study period, but for African American males, BDP risk increased considerably up to Wave VI, before decreasing. BDP risk was not associated with offending for African American females, but it was positively associated with offending for African American males. With respect to white females, risk remained either low or moderate over the study period (two trajectories), but followed an "adolescent onset" course for a third group. BDP risk was positively associated with offending for white females, but it is interesting to note that the onset of offending in early adulthood for one trajectory group of white females was not accompanied by a corresponding pattern of BDP risk. Trajectories of BDP risk for white males most closely resembled those for the full NYS sample, and risk in this domain was consistently positively associated with offending for this demographic subgroup.

ICA risk. Similar to other risk domains, models using data from the four demographic subgroups yielded trajectories that resembled ones found in the sample as a whole, although the number of trajectories identified varied across subgroups, and the shapes displayed minor variations. The most notable difference across demographic subgroups involved the lack of a trajectory for African American males and females in which risk decreased noticeably over time.

ICA risk was either weakly associated, or not associated at all, with offending levels for each of the demographic subgroups.

Analysis and Discussion

This section opens by reviewing the study's research questions and discussing the extent to which the findings provided useful answers to the questions. A discussion of the implications of the findings for prevention programs and policies follows. A brief discussion of the limitations of the study concludes the report.

Research Questions

This study aimed to answer six research questions. Each is presented below along with a discussion of relevant findings.

How do violent offending trajectories that extend into adulthood compare with offending trajectories reported in other studies, especially with respect to the number and shapes of distinct trajectories? Consistent with the results of studies by Broidy and colleagues (2003), McDermott and Nagin (2001), and others (see Dodge & Pettit, 2003; and especially Piquero, 2004, for a review), the current findings indicate that the majority of youths reported low and stable levels of offending over time. Nearly 68% of the full sample was classified as being in the low/stable group in the best trajectory model from these analyses. The focus of this study was violent offending only, and data from all seven waves of the NYS permitted an examination of the course of offending into early adulthood. When limited to violent offending, the low and stable level of offending found in previous studies for the majority of youths through adolescence, persisted into young adulthood in the current sample. Also consistent with previous research was the existence of an early onset/chronic trajectory, in which offending was fairly high and relatively stable over time. This trajectory group included roughly five percent of the

sample. However, in contrast to the results of Broidy and colleagues (2003), two – and perhaps three – of the trajectory groups identified here were characterized by a lack of stability over time in offending. For example, the early/onset desister group (3.4% of the sample) displayed a marked decrease in the probability of classification as a violent offender over time, although this trend reversed from Wave VI to Wave VII. Such a trajectory did correspond to one reported by McDermott and Nagin (2001), who used the NYS dataset through Wave VI, but whose measure of offending included nonviolent actions. Unfortunately lack of data beyond Wave VII precluded further study of this trajectory group with the NYS sample. Also consistent with results of McDermott and Nagin (but not of Broidy and colleagues) was the adolescent onset trajectory of offending, which comprised almost 12% of this sample. For the adolescent onset group, the probability of classification as a violent offender remained relatively high into early adulthood, although there was a gradual decrease after age 18, with the decrease leveling somewhat by age 21. Finally, one trajectory was characterized by a fairly low and stable level of offending until roughly age 18, at which point the probability of classification as a violent offender increased. This young adult onset group is also consistent with findings from other studies that used the trajectory methodology (Piquero, 2004). In sum, the findings of this study highlight both stability of a low level of offending for the majority of youths as they age, along with the persistence of violent offending into early adulthood for a relatively small but substantial proportion of youths. As noted earlier, our procedure for measuring offending involved dichotomizing at the 90th percentile, and the trajectories identified here described patterns of change over time in the probability of being classified as a violent offender based on this criterion. Thus, status as a violent offender did not directly reflect absolute offending levels. However, as reported above, average scores on the original undichotomized offending variable indicated that members of the

chronic and adolescent onset groups displayed higher levels of offending relative to other sample members at every wave.

How do background characteristics and risk factors differ across offending trajectory groups, that is, what are the profiles of distinct trajectory groups? Specifically, do fixed risk factors measured at Wave I (e.g., low SES, parent beliefs legitimizing aggression), and time-varying risk factors (e.g., lack of adult monitoring, deviant peer involvement, and youth's beliefs legitimizing aggression) differ in predictable ways across trajectory groups? As noted earlier, the trajectory model provides parameter estimates that describe the shape of distinct patterns of change over time as well as estimates of the probability, for each observation, that a particular trajectory best describes that individual's pattern of change. Based on these estimates, it is possible to assign each observation to a particular trajectory group; however, there is uncertainty in group membership and it should be recalled that change for an observation assigned to a particular group does not necessarily follow that trajectory exactly (see Piquero, 2004; Sampson et al,. 2004). That said, additional analyses based on trajectory group membership indicated that being male was the most consistent risk factor for membership in a trajectory group for which the probability of classification as a violent offender was high, relative to the largest and normative low/stable group. This was especially true with respect to the early onset/chronic group, as evidenced by the magnitude of the estimated odds ratio (10.1) from the logistic model predicting membership in this group relative to the low/stable group. Sex was the only factor that distinguished the early onset/chronic from the early onset/desister group an a logistic model, and it was a significant predictor in all but one of the logistic models. Race/ethnicity was not predictive of trajectory group membership with one exception: the probability of inclusion in the early onset/desister group versus the low/stable group was higher for African American youths,

relative to their white counterparts. Two family-level risk factors, parental beliefs legitimizing aggression and low SES, were significant predictors in the model comparing the low/stable and adolescent onset groups. Lower SES was also modestly predictive of membership in the young adult onset group relative to the low/stable group. Individual-level risk factors measured at Wave I – beliefs legitimizing aggression, bonding with delinquent peers, and involvement in conventional activities – were significantly and positively related with membership in the two groups where the probability of classification as a violent offender was initially high. In sum, the results presented here are largely consistent with existing literature on the course of violent offending over time and risk factors for offending. The results extend previous work by providing support for the role of individual-level risk factors in offending.

We also completed a series of analyses of variance, with pairwise comparisons, to assess the effect of risk trajectory group membership on offending, using the undichotomized summed violent offending score as the outcome variable. The same set of analyses was completed for the sample as a whole, and for each demographic subgroup. As described in detail above, these analyses provided evidence that BLA and BDP acted as risk factors for violent offending. These effects were found in the full sample and for the subgroups, although BDP was not a risk factor for African American females and BLA was not a risk factor for African American males. Although there were exceptions as noted above, changes in risk levels corresponded with changes in offending over time, and these patterns provided additional evidence of effects of risk on offending that continued through much, in not all, of the study period. In contrast to beliefs legitimizing aggression and bonding with delinquent peers risk domains, ICA risk did not appear to have an effect on offending levels for the sample as a whole, nor for demographic subgroups.

Is there evidence of late-onset violent offending and if so, which risk factors are related to membership in the late-onset group? Does late onset characterize the violent offending trajectories of subgroups defined by sex and race/ethnicity? Adolescent onset violent offending characterized one trajectory in the best model for the full NYS sample, and a similar trajectory was present in each of the models that were fit for four demographic subgroups: African American females, African American males, white females, and white males. Risk factors for status as a member of the adolescent onset group in the full sample were described immediately above. Of note were patterns of offending in each of these trajectories during the later waves of the study. For the full sample, the probability of being classified as a violent offender was close to zero at Wave but increased steadily for several waves. It began to decrease at age 18, and the decrease continued over the rest of the study period, although the probability remained close to .30 at Wave VII. In the model using data on African American females, the baseline probability was greater in this trajectory relative to its counterpart in the full sample, and the decrease in probability began later – at about age 21. A similar pattern was present for African American males; however, for this subgroup, the probability of classification as a violent offender did not display a consistent decrease in later waves. The model for white females yielded a somewhat similar trajectory, although in this subgroup, a decrease in probability was more pronounced, and the probability increased noticeably from Wave VI to VII. Given that baseline probability of violent offender status was around .30 in these trajectories, a better name might be *adolescent/escalation*, and not true adolescent onset. In contrast, for white males, the probability was low at baseline, and adolescent onset is more accurate. Similar to African American males, this trajectory failed to display a noticeable and consistent downward trend in later waves. In addition to these trajectory groups, the full sample analysis and the subgroup analysis for white

females yielded trajectories characterized by young adult onset (i.e., at age 18). This pattern of offending is consistent with results of recent research using the trajectory methodology (see Piquero, 2004 for a review), but it is at odds with current developmental criminological theory regarding the course of offending over time.

Are there distinct trajectories of risk levels over time for youth's beliefs legitimizing aggression, bonding with delinquent peers, and involvement in conventional activities? Alternatively, does a single trajectory for a particular risk factor describe changes in risk levels over time in the NYS sample? As described in detail above, risk trajectories varied with respect to shape and number across three domains of risk: beliefs legitimizing aggression (BLA), bonding with delinquent peers (BDP), and (lack of) involvement in conventional activities (ICA). Seven distinct BLA risk trajectories were present in the single trajectory model using data from the full sample although some of the trajectories identified in the model were, potentially, redundant. Models fit with the four demographic subgroups identified various numbers of trajectories across the subgroups; however, each trajectory identified in such models corresponded fairly closely to a trajectory from the full-sample model. A similar set of results emerged from analyses of BDP and ICA risk. A large majority of youths were classified as being in one of the lower risk groups on BDP and BLA, in full-analyses as well as analyses by demographic subgroups. Thus, these analyses indicated that most youths experience relatively low levels of risk in these domains over adolescence and into early adulthood. In contrast, youths were more evenly distributed among the seven ICA risk trajectories. For the BLA and BDP risk domains in particular, models were characterized by trajectories whose shapes (e.g., increasing, decreasing, stable) were not apparent in a simple analysis of the average level of risk over time for the sample as a whole. Thus, as

intended, the trajectory models were able to depict unobserved heterogeneity in patterns of change in risk over time (Nagin, 1999).

Are there distinct trajectories of risk levels over time using a cumulative risk index? As noted above, analyses using a cumulative index of risk did not provide additional insight into the nature of changes in risk over time. Details of these analyses are available from the first author, but they are not reported here.

If there are distinct trajectories of risk levels, do distinct dual trajectories of offending and risk exist? If so, what do the conditional and joint probability distributions of membership in offending group and risk group reveal about the relationship between risk and offending and how this changes over time? The results of the dual trajectory model of violent offending and BLA risk provided evidence that low and moderate levels of BLA risk were associated with low levels of offending during early adolescence. Additionally, relatively high levels of BLA risk were accompanied by a greater probability of being classified as a violent offender. In another words, moderate levels of beliefs legitimizing aggression were not a risk factor for violent offending, whereas this was not true for higher levels of the variable. However, BLA risk level did not appear to play a role in desistance for early onset violent offenders. Finally, any protective effect of low and moderate levels of BLA risk appeared to be less important in later adolescence and young adulthood. Results of the dual model of offending with BDP risk suggested several conclusions. First, low – but not moderate – levels of BDP risk were accompanied by a lower level of violent offending. This differs from the results concerning BLA risk, where low and moderate risk levels were accompanied by low offending rates. Second, there was no evidence that a decrease in BDP risk contributed to desistance for early onset offenders. Third, BDP risk levels appeared to be unrelated to the onset of offending in young

adulthood. The dual model of offending with ICA risk suggested a lack of a relationship between the two variables, a finding consistent with earlier results.

Implications for Prevention Programs

A prevention framework originated in the field of public health and has been increasingly utilized in other fields, including juvenile justice, to organize and guide empirical and conceptual work on a particular health or social problem, such as youth violence. The aim of a prevention framework is to bring about a reduction of rates in a problem (Fraser, Randolph, & Bennett, 2000b; Mrazek & Haggerty, 1994; National Institute of Mental Health ([NIMH], 1998). The framework distinguishes three levels of prevention: primary, aimed at the general population of youths; secondary, aimed at youths who have been identified as being at increased risk of violent offending; and tertiary (also known as targeted prevention and often considered to be synonymous with treatment) aimed at youths who already display aggression and violence.

According to NIMH, a prevention framework highlights three challenges for researchers and practitioners:

- gaining greater understanding of the origins of problems and disorders;
- identifying risk and protective factors, and related risk and protective processes that are associated with problems and disorders; and
- translating knowledge about the origins of problems and disorders and about risk and protective processes into interventions that can be evaluated and, if effective, disseminated.

Results of the current study provide information about risk processes and their association with violent offending over time. This information can, in turn, guide the development of more specific assessment procedures and more precisely targeted interventions aimed at preventing violence.

Our findings showed that risk levels do not remain fixed over time. This is consistent with prior empirical findings and with conceptualizations of risk factors as being either fixed (e.g., male gender) or dynamic (e.g., beliefs) and hence potentially modifiable by social interventions (see, e.g., DeMatteo & Marczyk, 2005; Fraser & Galinsky, 2004; Hawkins et al., 2000). Far from being static, risk related to beliefs legitimizing aggression, bonding with delinquent peers, and lack of involvement in conventional activities followed distinct patterns of change over time for different subgroups of youths, both in the population as a whole and in population subgroups defined by race/ethnicity and sex. Moreover, a particular set of patterns (i.e., a trajectory model) was specific to a particular risk domain. Estimated risk trajectory group membership, based on trajectory model results, was related to violent offending for two of these risk domains, BLA and BDP. Better understanding of the nature of these complex relationships can lead to better procedures for assessing risk and planning interventions.

Beliefs legitimizing aggression is a well-conceptualized and well-researched risk factor for aggression and violence (see e.g., Dodge & Pettit, 2003; Williams, Ayers, Van Dorn, & Arthur, 2004). Intervention programs often target BLA, which is viewed as a key proximal mediator for use of aggression (Dodge & Pettit, 2003; Fraser, Nash, Galinsky, & Darwin, 2000b; Metropolitan Area Child Study Research Group, 2002). We found that BLA risk declined over time in the NYS sample as a whole, but trajectory models revealed distinct patterns of change over time in BLA for subgroups of youths. Patterns of BLA risk change were related to violent offending, but this relationship was stronger in earlier waves of the NYS relative to later waves, suggesting that BLA risk operates as a less salient risk factor for older adolescents and young adults. Additionally, exploratory analyses using a small sample of African American males

indicated that BLA risk was not associated with violent offending for this demographic subgroup.

Our results indicated that the relationship between BLA risk and violent offending was positive but nonlinear. A low and stable pattern of BLA risk was related to a low and stable probability of being classified as a violent offender. The converse was also true. A high level of BLA risk (albeit decreasing over time) was related to a high and stable probability of classification as a violent offender. However, a moderate level of BLA risk was not accompanied by an increase in the probability of violent offending; in fact, membership in the moderate/stable BLA risk group in the dual offending-BLA risk trajectory model was accompanied by a lower probability, relative to the sample as a whole, of being in the early onset/chronic offending group. This implies a need, first, for additional research aimed at replicating this finding with other samples and, if replicated, for research aimed at identifying a threshold level at which BLA risk becomes salient as a risk factor for aggression and violence. It also implies a need to develop and test measures of assessing BLA risk that are sufficiently sensitive for identifying youths who are truly at risk due to BLA. This is may be especially critical for young adolescents, given our finding that BLA risk level distinguished adolescent onset youths from low/stable offending youths in the dual trajectory model. In contrast, BLA risk level did not distinguish desisters from chronics among early onset violent offenders. Nor did it seem to contribute greatly to the onset of offending in young adulthood.

Together, these results have implications for targeting interventions aimed at preventing violence by reducing BLA. It may be that BLA reduction strategies represent a promising primary prevention strategy in interventions that target the general population of youth, especially children and young adolescents. African American males may benefit less from such

an approach, but our findings with respect to this subgroup should be viewed as highly tentative given its very small size in the NYS sample. A focus on reducing BLA may be less effective in primary prevention for older adolescents and in secondary or tertiary prevention aimed at youths who display problematic levels of aggression and violence in early adolescence. At the least, our findings suggest that a sole focus on reducing BLA in early onset youths will not be sufficient.

Risk pertaining to bonding with delinquent peers (BDP) appeared to increase for certain trajectory subgroups relatively later in adolescence, compared to other risk domains. Further, this risk domain was most consistently related to offending in the full sample and in three of four demographic subgroups. The model R^2s and effect sizes provided evidence of a fairly strong relationship between BDP risk and offending, although the magnitude of the relationship diminished in strength by late adolescence and early adulthood. This suggests that assessment of this risk factor in early adolescence may fail to identify youths who will go on to develop strong and problematic relationships with delinquent peers in middle and late adolescence. This may be especially critical for assessing risk in white females, the only demographic subgroup for which a young adult onset violent offending trajectory emerged from our analyses. Moreover, BDP risk was strongly related to violent offending for white females. In contrast to the findings with respect to BLA risk, there was no evidence that the relationship between BDP risk and offending was nonlinear. Thus, even moderate levels of BDP risk may signal a need for targeted intervention. Findings related to this risk domain underscore a need to focus prevention efforts on diluting the influence of delinquent peers across the entire span of adolescence, and if possible, into early adulthood. Preventing access to the delinquent peer group may be one approach, but this is likely to prove difficult in the long term unless alternatives are available to youths. This should involve providing youths with opportunities to participate in activities where

the majority of participants hold prosocial beliefs. Such an approach is often used for primary and secondary prevention, especially for children and young adolescents (Wasserman et al., 2003). However, the approach does not appear to be emphasized in current interventions aimed at preventing recidivism in adjudicated violent offenders (see Heilbrun, Lee, & Cottle, 2005). Although tentative, our results indicated that BDP did not operate as a risk factor for African American females, suggesting that a focus on other risk domains (e.g., beliefs legitimizing aggression) may be of greater utility for these youths.

Interestingly, the findings regarding a link between BDP and violent offending were not consistent with findings described by Hawkins and colleagues (2003) using data from the Seattle Social Development Project. In structural equation models testing the SDM, there was no relationship between antisocial bonding, measured at ages 14 to 16, and violence, measured at age 18 (Herrenkohl et al., 2001; Huang, Kosterman, Catalano, Hawkins, & Abbott, 2001). However, our measure of bonding with delinquent peers was based on the work of Elliot and colleagues (1985) and was calculated as the product of a peer involvement score (i.e., the amount of time spent with peers) and a peer delinquency score. Thus, it did not capture an affective component related to the extent to which youths perceived feelings of affiliation toward the deviant peer group. Although Elliot and colleagues termed the measure bonding, a more accurate name might be simply involvement with delinquent peers. In contrast, the SDM analyses included separate measures of antisocial involvement and antisocial bonding, and the latter measure did tap an affective component. With respect to prevention, it may be that decreasing exposure to delinquent peers is an important strategy even when youths have developed strong bonds with a delinquent peer group.

We found no evidence that involvement in conventional activities (ICA) was associated with the level of offending. This was true for the full sample and for each of the four demographic subgroups. Promoting involvement in conventional (or prosocial) activities is the focus of many prevention and intervention programs. However, our results suggest that this focus alone – which emphasizes the importance of adult supervision for adolescents – may be insufficient. It may be necessary to incorporate specific content that addresses factors such as BLA (e.g., social cognitive-based problem-solving and skills-training programs) into prevention programs, especially for younger youths who display problematic levels of risk in this domain. Moreover, results on BDP highlight a need to ensure that prevention programs aimed at increasing involvement in conventional activities are not composed exclusively of youths who have been identified as being at high risk of offending (see e.g., Dishion et al., 1999). Instead, there should be a focus on providing high risk youths with opportunities for involvement in activities in which large numbers of prosocial peers and adults participate. This may require providing one-on-one mentoring or coaching to increase the likelihood that such youths will be able to interact successfully in these activities. It should be emphasized that our measure of ICA incorporated an underlying assumption that so-called "conventional" activities occurred in settings that were relatively free of the influence of delinquent peers. This may not have been the case, and the makeup and prevailing norms of the peer group, along with the level of monitoring by a prosocial adult, in a particular setting might have influenced a youth's propensity to offend.

Limitations

A key limitation of the current study involves the fact that these data were collected from 1977 to 1988. Thus, results do not necessarily generalize to contemporary youths and young adults. The measure of violent offending used in the trajectory analyses, although based on prior

research using NYS data, was highly skewed. This led us to dichotomize the measure as described, which altered the nature of the information depicted in trajectory graphs. The sample demographics permitted analyses by important demographic subgroups, but the resulting sizes of the African American subsamples were small, and results of these analyses must be considered highly exploratory. Additionally, the NYS data did not include sufficient numbers of youths from other racial and ethnic backgrounds to permit detailed analyses of these subgroups. Missing data, especially in later waves of the NYS study, reduced the size of our analysis sample, resulting in differences between the profiles of our sample and the original sample; these sample aberrations should be kept in mind when interpreting results. It is also important that readers keep in mind the cautions of Piquero (2004) and Sampson and colleagues (2004) when interpreting the results of the trajectory models. The models provide a probabilistic approximation of population-level patterns of change over time. Individual respondents do not belong to a particular trajectory group with certainty, and membership in a particular trajectory group does not imply that a particular individual with follow that trajectory group with certainty. Finally, NYS data did not include information on a broad array of biological and family factors that have been identified as important risk factors for aggression in recent literature. Neighborhood data, as described earlier, were not available for early waves, thus precluding their use in the current analyses.

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Table 1: Descriptive Statistics for Offending Prior to Dichotomizing

Wave	*Range*	*M*	*SD*	75th %ile	90th %ile
I	1 – 2.11	1.11	0.16	1.11	1.33
II	1 – 2.11	1.10	0.15	1.11	1.22
III	1 – 2.56	1.08	0.15	1.11	1.22
IV	1 – 2.22	1.07	0.15	1.11	1.22
V	1 – 2.44	1.06	0.13	1.11	1.22
VI	1 – 2.00	1.05	0.11	1.10	1.20
VII	1 – 2.00	1.04	0.12	1.00	1.17

Table 2: Comparing Kept and Dropped Observations

	Observations		
	Kept (n = 1227)	Dropped (n = 498)	
Variable	*M* (*SD*) or *n* (%)	*M* (*SD*) or *n* (%)	Statistic
Age at Wave I	13.8 (1.9)	14.1 (1.9)	t = 3.11 **
Sex			
Female	618 (77%)	189 (23%)	
Male	609 (66%)	309 (34%)	χ^2 = 21.92 **
Race/ethnicity			
African American	170 (65%)	90 (35%)	
White	997 (73%)	364 (27%)	
Hispanic	42 (55%)	34 (45%)	
Asian American	11 (65%)	6 (35%)	
Native American	5 (63%)	3 (38%)	χ^2 = 17.12 **
Socioeconomic Status [a]	43.0 (16.6)	46.24 (16.1)	t = 3.53 **
Violent Offending [b]			
Wave I			
Yes	135 (61%)	85 (39%)	
No	1092 (73%)	413 (27%)	χ^2 = 11.71 **
Wave II			
Yes	120 (71%)	48 (29%)	
No	1107 (74%)	380 (26%)	χ^2 = 0.72
Wave III			
Yes	201 (72%)	79 (28%)	
No	1026 (76%)	320 (24%)	χ^2 = 2.47
Wave IV			
Yes	172 (74%)	60 (26%)	
No	1055 (80%)	256 (20%)	χ^2 = 4.86 *
Wave V			
Yes	151 (83%)	31 (17%)	
No	1076 (82%)	236 (18%)	χ^2 = 0.10
Wave VI			
Yes	144 (80%)	37 (20%)	
No	1083 (82%)	233 (18%)	χ^2 = 0.81
Wave VII			
Yes	187 (89%)	23 (11%)	
No	1040 (89%)	133 (11%)	χ^2 = 0.03

Table continues

Table 2: Comparing Kept and Dropped Observations

	Observations		
	Kept (n = 1227)	Dropped (n = 498)	
Variable	*M* (*SD*) or *n* (%)	*M* (*SD*) or *n* (%)	Statistic
Beliefs Legitimizing Aggression			
Wave I	2.00 (0.70)	2.04 (0.68)	t = 1.18
Wave II	1.89 (0.64)	1.98 (0.69)	t = 2.47 *
Wave III	1.87 (0.63)	1.95 (0.65)	t = 2.29 *
Wave IV	1.81 (0.61)	1.89 (0.62)	t = 2.05 *
Wave V	1.80 (0.60)	1.94 (0.63)	t = 3.43 **
Wave VI	1.58 (0.61)	1.64 (0.63)	t = 1.59
Wave VII	1.48 (0.59)	1.48 (0.55)	t = -0.14
Bonding with Delinquent Peers			
Wave I	3.15 (54.40)	7.16 (57.46)	t = 1.25
Wave II	3.29 (57.37)	8.77 (61.35)	t = 1.54
Wave III	3.75 (58.23)	6.71 (59.08)	t = 0.84
Wave IV	3.78 (57.21)	7.51 (65.66)	t = 0.89
Wave V	5.33 (57.98)	1.37 (56.36)	t = -0.96
Wave VI	5.28 (50.11)	3.96 (54.71)	t = -0.35
Wave VII	3.91 (40.37)	0.18 (34.69)	t = -1.14
Involvement in Conventional Activities [c]			
Wave I	-0.02 (0.54)	0.06 (0.57)	t =2.46 *
Wave II	-0.02 (0.55)	0.10 (0.60)	t = -3.63 **
Wave III	-0.01 (0.59)	0.12 (0.57)	t = 3.96 **
Wave IV	0.01 (0.46)	0.10 (0.46)	t = 3.09 **
Wave V	0.02 (0.47)	0.09 (0.45)	t = 2.20 *
Wave VI	-0.01 (0.49)	0.05 (0.51)	t = 1.91
Wave VII	-0.01 (0.53)	0.07 (0.48)	t = 1.79

Notes: [a] Socioeconomic status was measured by parent report at Wave I based on the Hollingshead two-factor Index with lower scores indicating higher SES (Hollingshead, 1975). [b] Violent offending was calculated using summed scores dichotomized at the 90th percentile; Table 1 provides descriptive statistics for the undichotomized variable in the analysis sample; "yes" response indicates observations in the high-offending groups; note increasing numbers of missing values from "dropped" column across waves. [c] Involvement in conventional activities was measured by averaging standardized scores on family, school, and community involvement scales (see Elliott et al., 1985) in Waves I – III; for Waves IV – VII this average score also included a measure of level of employment. * $p < .05$; ** $p < .01$

Table 3: Final Sample Descriptive Statistics

Variable	*M* or *n*	*SD* or %	Range
Sex			
Female	618	50%	
Male	609	50%	
Race/ethnicity			
White	997	81.4%	
African American	170	13.9%	
Hispanic	42	3.4%	
Asian	11	0.9%	
Native American	5	0.4%	
Age (Wave I)	13.78	1.96	11 – 17
Age (Wave VII)	23.78	1.96	21 – 27
SES [a]	43.02	16.63	11 – 77
PBLA [b]	3.80	0.41	1 – 4
Wave I Offending [c]	135	11.0%	
Wave II Offending [c]	120	9.8%	
Wave III Offending [c]	201	16.4%	
Wave IV Offending [c]	172	14.0%	
Wave V Offending [c]	151	12.3%	
Wave VI Offending [c]	144	11.7%	
Wave VII Offending [c]	187	15.2%	
Wave I BLA [d]	2.00	0.70	1 – 5
Wave II BLA [d]	1.89	0.64	1 – 4.5
Wave III BLA [d]	1.87	0.63	1 – 5
Wave IV BLA [d]	1.81	0.61	1 – 5
Wave V BLA [d]	1.80	0.60	1 – 4
Wave VI BLA [d]	1.58	0.61	1 – 5
Wave VII BLA [d]	1.48	0.59	1 – 5
Wave I BDP [e]	3.15	54.40	-99.10 – 268.72
Wave II BDP [e]	3.29	57.37	-105.74 – 434.26
Wave III BDP [e]	3.75	58.23	-120.52 – 440.87
Wave IV BDP [e]	3.78	57.21	-115.97 – 451.76
Wave V BDP [e]	5.33	57.98	-113.40 – 286.16
Wave VI BDP [e]	5.28	50.11	-102.24 – 407.76
Wave VII BDP [e]	3.91	40.37	-88.58 – 316.42
Wave I ICA [f]	-0.02	0.54	-1.76 – 1.94
Wave II ICA [f]	-0.02	0.55	-1.97 – 2.03
Wave III ICA [f]	-0.01	0.59	-2.07 – 1.77
Wave IV ICA [f]	0.01	0.46	-1.68 – 1.31
Wave V ICA [f]	0.02	0.47	-1.69 – 1.19
Wave VI ICA [f]	-0.01	0.49	-1.69 – 1.06
Wave VII ICA [f]	-0.01	0.53	-1.99 – 1.24

Table continues

Notes: $N = 1227$. [a] SES = Socioeconomic Status, measured at Wave I and computed based on the Hollingshead two-factor Index with lower scores indicating higher SES (Hollingshead, 1975). [b] PBLA = Parental beliefs legitimizing aggression, measured at Wave I with a single item endorsing use of aggression, with lower scores reflecting stronger beliefs legitimizing aggression. [c] Offending was measured using summed scores on multiple items and dichotomizing at the 90th percentile; frequencies and percentages provided here represent youths classified as "high" on offending; percentages other than 10% are due to ties; Table 1 provides descriptive statistics for undichotomized offending measure at each wave. [d] BLA = Beliefs legitimizing aggression (youth). [e] BDP = Bonding with delinquent peers. [f] ICA = Involvement in conventional activities.

Table 4: Average Group Membership Probabilities for 5-Group Offending Trajectory

	Probability of Membership				
Assigned Group	1	2	3	4	5
1	.86	.01	.04	.09	< .01
2	.18	.78	< .01	.04	< .01
3	< .01	< .01	.84	.05	.10
4	< .01	.02	.03	.88	.06
5	< .01	< .01	.04	.08	.87

Note:
Group 1 = Young adult onset;
Group 2 = Low/stable;
Group 3 = Early onset/desister;
Group 4 = Adolescent onset;
Group 5 = Early onset/chronic.

Table 5: Offending Trajectory Group Profiles (N = 1227)

		Offending Trajectory Group [a]				
	Full Sample	1	2	3	4	5
Group size	1227 (100%)	145 (11.8%)	829 (67.6%)	42 (3.4%)	146 (11.9%)	65 (5.3%)
% Male **	50%	61.4%	40.1%	66.7%	71.2%	86.2%
Mean Age at Wave I	13.78	13.9 [b]	13.8 [b]	14.0 [b c]	13.2 [c]	13.8 [b c]
Race/ethnicity *						
White	81.4%	83.3%	83.0%	71.4%	75.3%	76.9%
African American	13.9%	13.9%	12.4%	26.2%	18.5%	13.9%
Hispanic, Asian, or Native American	4.7%	2.8%	4.6%	2.4%	6.2%	9.2%
Mean Wave I SES [d]	43.02	43.8 [b c]	41.7 [b]	48.1 [b c]	46.7 [c]	45.8 [b c]
Mean Wave I PBLA [e]	3.80	3.85	3.81	3.83	3.72	3.78
Mean Wave I BLA [f]	2.00	2.02 [b c]	1.90 [b]	2.70 [i]	2.12 [c]	2.48 [i]
Mean Wave I BDP [g]	3.15	8.66 [b c]	-5.10 [b]	58.0 [c i]	-0.78 [b c]	61.6 [i]
Mean Wave I ICA [h]	0.02	0.00 [b c]	-0.05 [b]	0.20 [c i]	-0.01 [b c]	0.24 [i]

Note: [a] Group 1 = Young adult onset; Group 2 = Low/stable; Group 3 = Early onset/desister; Group 4 = Adolescent onset; Group 5 = Early onset/chronic. [b c i] Groups that do not share a superscript differ significantly at the .05 level in multiple comparisons using the Bonferroni correction. The mean difference on age between groups 3 and 4, although nonsignificant, is greater than the mean difference between 1 and 4 and 2 and 4. A similar pattern was evident when comparing SES between groups 2 and 3 (nonsignificant) and groups 2 and 4 (significant). These aberrations are likely due to the small size of group 3. [d] SES = Socioeconomic Status. [e] PBLA = Parental beliefs legitimizing aggression. [f] BLA = Beliefs legitimizing aggression; range = 1 to 5 at Wave I. [g] BDP = Bonding with delinquent peers; range = -105.74 to 434.26 at Wave I.. [h] ICA = (Lack of) Involvement in conventional activities, with higher scores representing greater risk; range = -1.76 to 1.94 at Wave I. * $p < .05$. ** $p < .01$

Table 6: Average Group Membership Probabilities for 7-Group Risk Trajectory of Beliefs Legitimizing Aggression

	Probability of Membership						
Assigned Group	1	2	3	4	5	6	7
1	.75	.06	.14	.04	.01	<.01	<.01
2	.02	.90	.07	<.01	.01	<.01	<.01
3	.02	.07	.73	.02	.16	<.01	<.01
4	.02	<.01	.06	.81	.08	.02	.01
5	<.01	.01	.09	.04	.84	.02	<.01
6	<.01	<.01	.02	.05	.07	.84	.01
7	<.01	<.01	<.01	.04	<.01	.04	.92

Note:
Group 1 = Moderate risk/quick decrease;
Group 2 = Low/stable;
Group 3 = Low-moderate risk/slow decrease;
Group 4 = Moderate risk/slow decrease;
Group 5 = Low-moderate risk/stable;
Group 6 = Increasing/decreasing;
Group 7 = High risk/decreasing.

Table 7: Summed Offending Scores by BLA Risk Group at Waves I to VII (N = 1227)

	Wave I		Wave II		Wave III		Wave IV	
BLA Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/ Stable (27.8%)	1.05	.09	1.04	.08	1.03	.07	1.03	.08
Low-moderate/slow decrease (26.2%)	1.09	.12	1.09	.13	1.07	.11	1.05	.11
Low-moderate/ stable (24.8%)	1.11	.15	1.08	.11	1.08	.14	1.07	.13
Moderate/slow decrease (11.0%)	**1.19**	**.21**	**1.17**	**.18**	**1.13**	**.20**	**1.12**	**.20**
Increasing/ Decreasing (4.2%)	**1.24**	**.23**	**1.28**	**.26**	**1.30**	**.22**	**1.24**	**.25**
Moderate/Quick decrease (3.7%)	1.16	.18	1.12	.15	1.09	.14	1.08	.13
High/ Decreasing (2.4%	**1.36**	**.32**	**1.36**	**.29**	**1.31**	**.35**	**1.29**	**.28**
Model R^2	.16		.20		.18		.15	
Full Sample	1.11	0.16	1.10	0.15	1.08	0.15	1.07	0.15

	Wave V		Wave VI		Wave VII	
BLA Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/ Stable (27.8%)	1.02	.07	1.03	.08	1.02	.08
Low-moderate/slow decrease (26.2%)	1.05	.11	1.03	.06	1.04	.12
Low-moderate/ stable (24.8%)	1.06	.12	1.06	.12	1.04	.11
Moderate/slow decrease (11.0%)	**1.09**	**.17**	**1.07**	**.13**	**1.07**	**.16**
Increasing/ Decreasing (4.2%)	**1.20**	**.21**	**1.14**	**.17**	**1.10**	**.14**
Moderate/Quick decrease (3.7%)	1.05	.09	1.03	.05	1.04	.09
High/ Decreasing (2.4%	**1.25**	**.33**	**1.18**	**.21**	**1.14**	**.23**
Model R^2	.12		.09		.04	
Full Sample	1.06	0.13	1.05	0.11	1.04	0.12

Notes: Means and standard deviations of summed offending measure, range 1 to 3. [a] BLA = Beliefs Legitimizing Aggression. Analyses of Variance revealed significant group effect at each Wave. Bold font indicates groups that were consistently higher than most other groups on aggression. Details of pairwise comparisons are available from the first author.

Table 8: Average Group Membership Probabilities for 7-Group Risk Trajectory of Bonding with Delinquent Peers

	Probability of Membership						
Assigned Group	1	2	3	4	5	6	7
1	.82	.18	<.01	<.01	<.01	<.01	<.01
2	.16	.76	.07	<.01	.01	<.01	<.01
3	<.01	.14	.79	.01	.03	.03	<.01
4	<.01	<.01	.04	.93	<.01	.03	<.01
5	<.01	.07	.04	<.01	.87	.02	<.01
6	<.01	.01	.06	.01	.03	.89	<.01
7	<.01	<.01	<.01	.04	<.01	.03	.94

Note:
Group 1 = Low/stable (A);
Group 2 = Low/stable (B);
Group 3 = Moderate/stable;
Group 4 = High/decreasing;
Group 5 = Low/increasing/decreasing (A;
Group 6 = Low/increasing/decreasing (B);
Group 7 = High/slight increase/decrease.

Table 9: Summed Offending Scores by BDP Risk Group at Waves I to VII (N = 1227)

	Wave I		Wave II		Wave III		Wave IV	
BDP Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/stable (B) (39.0%)	1.09	.13	1.07	.12	1.06	.11	1.05	.10
Low/stable (A) (31.2%)	1.06	.12	1.05	.08	1.04	.09	1.03	.06
Moderate/Stable (14.4%)	1.16	.16	1.13	.16	1.10	.14	1.08	.13
Low/increasing/ decreasing(B) (5.2%)	1.15	.16	1.17	.16	1.24	.23	1.22	.22
Low/increasing/ decreasing(A) (4.4%)	1.15	.15	1.14	.15	1.14	.15	1.14	.22
High/decreasing (4.2%)	1.30	.26	1.23	.24	1.19	.20	1.15	.24
High/slight increase/ Decrease (1.5%)	1.50	.35	1.57	.33	1.52	.43	1.48	.40
Model R^2	.19		.24		.24		.22	
Full Sample	1.11	0.16	1.10	0.15	1.08	0.15	1.07	0.15

	Wave V		Wave VI		Wave VII	
BDP Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/stable (B) (39.0%)	1.05	.10	1.04	.09	1.03	.10
Low/stable (A) (31.2%)	1.02	.07	1.02	.07	1.02	.09
Moderate/Stable (14.4%)	1.05	.12	1.04	.10	1.05	.12
Low/increasing/ decreasing(B) (5.2%)	1.17	.21	1.08	.10	1.10	.21
Low/increasing/ decreasing(A) (4.4%)	1.12	.20	1.17	.21	1.10	.16
High/decreasing (4.2%)	1.10	.16	1.08	.13	1.08	.15
High/slight increase/ Decrease (1.5%)	1.40	.39	1.31	.22	1.21	.22
Model R^2	.17		.17		.06	
Full Sample	1.06	0.13	1.05	0.11	1.04	0.12

Notes: Means and standard deviations of summed offending measure, range 1 to 3. [a] BDP = Bonding with Delinquent Peers. Analyses of Variance revealed significant group effect at each Wave. Details of pairwise comparisons are available from the first author.

Table 10: Average Group Membership Probabilities for 7-Group Risk Trajectory of Involvement in Conventional Activities

	Probability of Membership						
Assigned Group	1	2	3	4	5	6	7
1	.82	.06	.09	.03	<.01	<.01	<.01
2	.04	.77	.01	.14	.03	<.01	<.01
3	.06	.01	.79	.12	<.01	.02	<.01
4	.01	.05	.08	.72	.09	.05	<.01
5	<.01	.01	<.01	.10	.74	.09	.05
6	<.01	<.01	.02	.10	.13	.72	.03
7	<.01	<.01	<.01	<.01	.10	.04	.86

Note:
Group 1 = Low/stable;
Group 2 = Moderate/decreasing;
Group 3 = Low/increasing;
Group 4 = Moderate/stable;
Group 5 = Moderate-high/slight decrease;
Group 6 = Moderate/increasing;
Group 7 = High/slight decrease.

Table 11: Summed Offending Scores by ICA Risk Group at Waves I to VII (N = 1227)

	Wave I		Wave II		Wave III		Wave IV	
ICA Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Moderate/ stable (27.5%)	1.09	.13	1.08	.12	1.07	.13	1.06	.10
Moderate-high/Slight decrease (21%)	1.14	.17	1.12	.15	1.10	.16	1.08	.17
Moderate Increasing (12.8%)	1.11	.17	1.10	.19	1.09	.18	1.09	.19
Low/ increasing (12.0%)	1.09	.15	1.09	.15	1.07	.14	1.07	.16
Moderate/ decreasing (9.7%)	1.08	.17	1.06	.11	1.06	.10	1.04	.08
High/ Slight decrease (9.1%)	1.17	.22	1.15	.22	1.13	.22	1.10	.21
Low/ stable (8%)	1.10	.13	1.07	.12	1.06	.11	1.05	.10
Model R^2	.03		.03		.02		.01	
Full Sample	1.11	0.16	1.10	0.15	1.08	0.15	1.07	0.15

	Wave V		Wave VI		Wave VII	
ICA Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*
Moderate/ stable (27.5%)	1.05	.10	1.05	.11	1.03	.10
Moderate-high/Slight decrease (21%)	1.07	.15	1.06	.11	1.05	.12
Moderate Increasing (12.8%)	1.06	.14	1.05	.11	1.06	.15
Low/ increasing (12.0%)	1.05	.15	1.05	.12	1.06	.16
Moderate/ decreasing (9.7%)	1.04	.09	1.04	.08	1.02	.07
High/ Slight decrease (9.1%)	1.09	.20	1.05	.12	1.07	.14
Low/ stable (8%)	1.05	.09	1.04	.12	1.02	.09
Model R^2	ns		ns		.02	
Full Sample	1.06	0.13	1.05	0.11	1.04	0.12

Notes: Means and standard deviations of summed offending measure, range 1 to 3. [a] ICA = Involvement in Conventional Activities. ns = model R^2 was not significantly different from 0.

Table 12: Offending and Beliefs Legitimizing Aggression Dual Trajectories – Marginal and Conditional Probabilities

Marginal Probabilities

Offending Trajectory Group

Young adult onset	Low/ stable	Early onset/ desister	Adolescent onset	Early onset/ chronic
.195	.610	.042	.076	.071

BLA Trajectory Group

Low/ stable	Moderate/ decrease	Moderate/ stable	High/ decrease
.224	.253	.425	.099

Conditional Probabilities I: P(Offending Group | BLA Group)

BLA group = Low/stable

P(Offending = Young adult onset)	P(Offending = Low/ stable)	P(Offending = Early onset/ Desister)	P(Offending = Adolescent onset)	P(Offending = Early onset/ Chronic)
.121	.844	.003	.024	.008

BLA group = Moderate/decrease

P(Offending = Young adult onset)	P(Offending = Low/ stable)	P(Offending = Early onset/ Desister)	P(Offending = Adolescent onset)	P(Offending = Early onset/ Chronic)
.229	.600	.031	.104	.036

BLA group = Moderate/stable

P(Offending = Young adult onset)	P(Offending = Low/ stable)	P(Offending = Early onset/ Desister)	P(Offending = Adolescent onset)	P(Offending = Early onset/ Chronic)
.247	.602	.029	.076	.045

BLA group = High/decrease

P(Offending = Young adult onset)	P(Offending = Low/ stable)	P(Offending = Early onset/ Desister)	P(Offending = Adolescent onset)	P(Offending = Early onset/ Chronic)
.045	.134	.216	.127	.478

Table continues

Table 12: Offending and Beliefs Legitimizing Aggression Dual Trajectories – Marginal and Conditional Probabilities

Conditional Probabilities II: P(BLA Group | Offending Group)

Offending group = Young adult onset			
P(BLA= Low/ stable)	P(BLA = Moderate/ decrease)	P(BLA = Moderate/ stable)	P(BLA = High/ decrease)
.139	.297	.540	.023
Offending group = Low/stable			
P(BLA= Low/ stable)	P(BLA = Moderate/ decrease)	P(BLA = Moderate/ stable)	P(BLA = High/ decrease)
.310	.249	.420	.022
Offending group = Adolescent onset			
P(BLA= Low/ stable)	P(BLA = Moderate/ decrease)	P(BLA = Moderate/ stable)	P(BLA = High/ decrease)
.071	.343	.423	.164
Offending group = Early onset/desister			
P(BLA= Low/ stable)	P(BLA = Moderate/ decrease)	P(BLA = Moderate/ stable)	P(BLA = High/ decrease)
.016	.187	.290	.507
Offending group = Early onset/chronic			
P(BLA= Low/ stable)	P(BLA = Moderate/ decrease)	P(BLA = Moderate/ stable)	P(BLA = High/ decrease)
.022	.117	.249	.611

Notes: BLA = Beliefs Legitimizing Aggression. Offending groups are ordered to permit comparison of selected groups: Low-baseline offending groups (rows 1 to 3) and High-baseline offending groups (rows 4 and 5).

Table 13: Offending and Beliefs Legitimizing Aggression Dual Trajectories – Joint Probabilities

	Offending Group				
	Young adult onset	Low/ Stable	Early onset/ desister	Adolescent onset	Early onset/ chronic
BLA Group					
Low/ stable	.027	.189	.001	.005	.002
Moderate/ decrease	.058	.152	.008	.026	.009
Low-moderate/ stable	.105	.256	.012	.032	.019
High/ decrease	.004	.013	.021	.013	.047

Note: BLA = Beliefs Legitimizing Aggression

Table 14: Offending and Bonding with Delinquent Peers Dual Trajectories – Marginal and Conditional Probabilities

Marginal Probabilities				
Offending Trajectory Group				
Young adult onset	Low/ stable	Early onset/ desister	Adolescent onset	Early onset/ chronic
.099	.648	.146	.034	.073
BDP Trajectory Group				
Low/ stable	Moderate/ stable	High/ decrease	High/ stable	
.651	.263	.068	.019	
Conditional Probabilities I: P(Offending Group | BDP Group)				
BDP group = Low/stable				
P(Offending = Young adult onset)	P(Offending = Low/ stable)	P(Offending = Early onset/ Desister)	P(Offending = Adolescent onset)	P(Offending = Early onset/ Chronic)
.052	.822	.097	.018	.001
BDP group = Moderate/stable				
P(Offending = Young adult onset)	P(Offending = Low/ stable)	P(Offending = Early onset/ Desister)	P(Offending = Adolescent onset)	P(Offending = Early onset/ Chronic)
.139	.385	.283	.081	.111
BDP group = High/decrease				
P(Offending = Young adult onset)	P(Offending = Low/ stable)	P(Offending = Early onset/ Desister)	P(Offending = Adolescent onset)	P(Offending = Early onset/ Chronic)
.406	.167	.123	.014	.290
BDP group = High/stable				
P(Offending = Young adult onset)	P(Offending = Low/ stable)	P(Offending = Early onset/ Desister)	P(Offending = Adolescent onset)	P(Offending = Early onset/ Chronic)
.068	<.001	<.001	<.001	.932

Table continues

Table 14: Offending and Bonding with Delinquent Peers Dual Trajectories – Marginal and Conditional Probabilities

Conditional Probabilities II: P(BDP Group | Offending Group)			
Offending group = Young adult onset			
P(BDP = Low/ stable)	P(BDP = Moderate/ stable)	P(BDP = High/ decrease)	P(BDP = High/ stable)
.339	.370	.278	.013
Offending group = Low/stable			
P(BDP = Low/ stable)	P(BDP = Moderate/ stable)	P(BDP = High/ decrease)	P(BDP = High/ stable)
.826	.156	.018	<.001
Offending group = Adolescent onset			
P(BDP = Low/ stable)	P(BDP = Moderate/ stable)	P(BDP = High/ decrease)	P(BDP = High/ stable)
.348	.624	.028	<.001
Offending group = Early onset/desister			
P(BDP = Low/ stable)	P(BDP = Moderate/ stable)	P(BDP = High/ decrease)	P(BDP = High/ stable)
.434	.509	.057	<.001
Offending group = Early onset/chronic			
P(BDP = Low/ stable)	P(BDP = Moderate/ stable)	P(BDP = High/ decrease)	P(BDP = High/ stable)
.092	.401	.269	.239

Notes: BDP = Bonding with delinquent peers. Offending groups are ordered to permit comparison of selected groups: Low-baseline offending groups (rows 1 to 3) and High-baseline offending groups (rows 4 and 5).

Table 15: Offending and Bonding with Delinquent Peers Dual Trajectories – Joint Probabilities

	Offending Group				
	Young adult onset	Low/ Stable	Early onset/ desister	Adolescent onset	Early onset/ chronic
BDP Group					
Low/ stable	.034	.535	.063	.012	.007
Moderate/ stable	.037	.101	.074	.021	.029
High/ decrease	.028	.011	.008	.001	.020
High/ stable	.001	<.001	<.001	<.001	.017

Note: BDP = Bonding with delinquent peers

Table 16: Offending and Involvement in Conventional Activities Dual Trajectories – Marginal and Conditional Probabilities

Marginal Probabilities

Offending Trajectory Group

Young adult onset	Low/ stable	Early onset/ desister	Adolescent onset	Early onset/ chronic
.106	.694	.086	.046	.068

ICA Trajectory Group

Moderate/ decrease	Low/ increase	Moderate/ stable	High/ stable
.126	.233	.460	.181

Conditional Probabilities I: P(Offending Group | ICA Group)

ICA group = Moderate/decrease

P(Offending = Young adult onset)	P(Offending = Low/ stable)	P(Offending = Early onset/ Desister)	P(Offending = Adolescent onset)	P(Offending = Early onset/ Chronic)
.115	.823	.039	.012	.011

ICA group = Low/increase

P(Offending = Young adult onset)	P(Offending = Low/ stable)	P(Offending = Early onset/ Desister)	P(Offending = Adolescent onset)	P(Offending = Early onset/ Chronic)
.114	.706	.095	.020	.065

ICA group = Moderate/stable

P(Offending = Young adult onset)	P(Offending = Low/ stable)	P(Offending = Early onset/ Desister)	P(Offending = Adolescent onset)	P(Offending = Early onset/ Chronic)
.107	.702	.107	.034	.050

ICA group = High/stable

P(Offending = Young adult onset)	P(Offending = Low/ stable)	P(Offending = Early onset/ Desister)	P(Offending = Adolescent onset)	P(Offending = Early onset/ Chronic)
.087	.566	.054	.135	.157

Table continues

Table 16: Offending and Involvement in Conventional Activities Dual Trajectories – Marginal and Conditional Probabilities

Conditional Probabilities II: P(ICA Group | Offending Group)

Offending group = Young adult onset			
P(ICA= Moderate/ decrease)	P(ICA = Low/ increase)	P(ICA = Moderate/ stable)	P(ICA = High/ stable)
.137	.250	.465	.149
Offending group = Low/stable			
P(ICA= Moderate/ decrease)	P(ICA = Low/ increase)	P(ICA = Moderate/ stable)	P(ICA = High/ stable)
.149	.237	.462	.148
Offending group = Adolescent onset			
P(ICA= Moderate/ decrease)	P(ICA = Low/ increase)	P(ICA = Moderate/ stable)	P(ICA = High/ stable)
.033	.099	.339	.529
Offending group = Early onset/desister			
P(ICA= Moderate/ decrease)	P(ICA = Low/ increase)	P(ICA = Moderate/ stable)	P(ICA = High/ stable)
.056	.258	.571	.114
Offending group = Early onset/chronic			
P(ICA= Moderate/ decrease)	P(ICA = Low/ increase)	P(ICA = Moderate/ stable)	P(ICA = High/ stable)
.020	.223	.337	.419

Notes: ICA = Involvement in Conventional Activities; higher values reflect greater risk. Offending groups are ordered to permit comparison of selected groups: Low-baseline offending groups (rows 1 to 3) and High-baseline offending groups (rows 4 and 5).

Table 17: Offending and Involvement in Conventional Activities Dual Trajectories – Joint Probabilities

	Offending Group				
	Young adult onset	Low/ Stable	Early onset/ desister	Adolescent onset	Early onset/ chronic
ICA Group					
Moderate/ decrease	.014	.103	.005	.002	.001
Low/ increase	.027	.164	.022	.005	.015
Moderate/ stable	.049	.323	.049	.016	.023
High/ stable	.016	.102	.001	.025	.028

Note: ICA = Involvement in Conventional Activities; higher values reflect greater risk

Table 18: Summed Offending Scores by BLA Risk Group at Waves I to VII – African American Females (n = 76)

	Wave I		Wave II		Wave III		Wave IV	
BLA Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/decreasing (28.9%)	1.06	.08	1.04	.07	1.04	.07	1.03	.08
High/decreasing (11.8%)	1.17	.00	1.11	.18	1.10	.12	1.07	.10
Moderate/stable (55.3%)	1.07	.09	1.08	.15	1.03	.05	1.05	.08
High/slight increase/ slight decrease (3.9%)	1.22	.29	1.26	.06	1.15	.26	1.26	.45
Model R^2	.17		.11		.14		.14	

	Wave V		Wave VI		Wave VII	
BLA Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/decreasing (28.9%)	1.05	.12	1.04	.11	1.02	.08
High/decreasing (11.8%)	1.07	.10	1.01	.03	1.00	.00
Moderate/stable (55.3%)	1.04	.08	1.05	.10	1.03	.09
High/slight increase/ slight decrease (3.9%)	1.22	.19	1.22	.22	1.17	.29
Model R^2	.12		.11		ns	

Notes: Means and standard deviations of summed offending measure, range 1 to 3. [a] BLA = Beliefs Legitimizing Aggression. ns = model R^2 was not significantly different from 0.

Table 19: Summed Offending Scores by BDP Risk Group at Waves I to VII – African American Males (n = 94)

	Wave I		Wave II		Wave III		Wave IV	
BDP Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/stable (77.7%)	1.11	.15	1.11	.13	1.09	.16	1.07	.12
Moderate/stable (20.2%)	1.22	.19	1.23	.25	1.25	.18	1.23	.25
Moderate/increasing/ decreasing (2.1%)	1.22	.31	1.67	.31	1.72	.39	1.56	.79
Model R^2	.08		.25		.29		.22	

	Wave V		Wave VI		Wave VII	
BDP Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/stable (77.7%)	1.05	.11	1.05	.09	1.05	.13
Moderate/stable (20.2%)	1.14	.15	1.09	.13	1.13	.17
Moderate/increasing/ decreasing (2.1%)	1.72	.86	1.51	.41	1.33	.24
Model R^2	.32		.29		.12	

Notes: Means and standard deviations of summed offending measure, range 1 to 3. [a] BDP = Bonding with Delinquent Peers.

Table 20: Summed Offending Scores by BLA Risk Group at Waves I to VII – White Females (n = 509)

	Wave I		Wave II		Wave III		Wave IV	
BLA Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/decreasing (44.6%)	1.04	.08	1.02	.06	1.02	.06	1.02	.06
Moderate/decreasing (29.7%)	1.09	.13	1.06	.11	1.05	.12	1.05	.13
Moderate/slight increase (19.4%)	1.05	.08	1.03	.07	1.03	.08	1.03	.07
High/decreasing (6.3%)	1.17	.16	1.11	.16	1.14	.19	1.16	.28
Model R^2	.10		.08		.08		.09	

	Wave V		Wave VI		Wave VII	
BLA Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/decreasing (44.6%)	1.01	.04	1.02	.05	1.02	.07
Moderate/decreasing (29.7%)	1.04	.11	1.02	.05	1.03	.11
Moderate/slight increase (19.4%)	1.02	.05	1.03	.06	1.01	.07
High/decreasing (6.3%)	1.10	.21	1.05	.12	1.05	.12
Model R^2	.06		.03		ns	

Notes: Means and standard deviations of summed offending measure, range 1 to 3. [a] BLA = Beliefs Legitimizing Aggression. ns = model R^2 was not significantly different from 0.

Table 21: Summed Offending Scores by BDP Risk Group at Waves I to VII – White Females (n = 509)

	Wave I		Wave II		Wave III		Wave IV	
BDP Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/slight increase (77.1%)	1.05	.09	1.03	.07	1.03	.07	1.02	.07
Moderate/slight decrease (20.8%)	1.11	.14	1.06	.10	1.07	.12	1.05	.12
Moderate/increasing decreasing (2.2%)	1.22	.20	1.29	.20	1.30	.29	1.45	.39
Model R^2	.10		.20		.18		.30	

	Wave V		Wave VI		Wave VII	
BDP Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/slight increase (77.1%)	1.02	.05	1.02	.05	1.01	.06
Moderate/slight decrease (20.8%)	1.03	.08	1.03	.06	1.03	.10
Moderate/increasing decreasing (2.2%)	1.37	.33	1.13	.15	1.18	.32
Model R^2	.31		.09		.08	

Notes: Means and standard deviations of summed offending measure, range 1 to 3. [a] BDP = Bonding with Delinquent Peers.

Table 22: Summed Offending Scores by BLA Risk Group at Waves I to VII – White Males (n = 488)

	Wave I		Wave II		Wave III		Wave IV	
BLA Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/stable (17.2%)	1.09	.12	1.07	.12	1.04	.10	1.05	.12
Moderate/decreasing (11.9%)	1.14	.13	1.13	.16	1.08	.10	1.05	.07
Moderate-high/ decreasing (14.5%)	1.21	.22	1.19	.17	1.17	.21	1.11	.15
Moderate/stable (46.7%)	1.14	.15	1.12	.13	1.11	.13	1.08	.13
Moderate/increasing/ decreasing (5.5%)	1.23	.23	1.30	.28	1.23	.19	1.23	.25
High/decreasing (4.1%)	1.48	.33	1.40	.33	1.39	.39	1.32	.28
Model R^2	.17		.18		.17		.16	

	Wave V		Wave VI		Wave VII	
BLA Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/stable (17.2%)	1.04	.07	1.05	.12	1.03	.10
Moderate/decreasing (11.9%)	1.05	.09	1.03	.07	1.08	.13
Moderate-high/ decreasing (14.5%)	1.12	.17	1.08	.14	1.09	.18
Moderate/stable (46.7%)	1.07	.11	1.07	.10	1.05	.12
Moderate/increasing/ decreasing (5.5%)	1.19	.20	1.14	.18	1.10	.19
High/decreasing (4.1%)	1.26	.38	1.18	.22	1.15	.24
Model R^2	.12		.07		.04	

Notes: Means and standard deviations of summed offending measure, range 1 to 3. [a] BLA = Beliefs Legitimizing Aggression.

Table 23: Summed Offending Scores by BDP Risk Group at Waves I to VII – White Males (n =488)

	Wave I		Wave II		Wave III		Wave IV	
BDP Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/stable (A) (42.6%)	1.10	.12	1.08	.10	1.07	.11	1.05	.08
Low/stable (B) (35.7%)	1.16	.16	1.15	.16	1.11	.14	1.09	.13
Moderate/decreasing (10.2%)	1.27	.25	1.25	.22	1.22	.23	1.15	.20
Low/increasing/ slight decrease (8.8%)	1.17	.13	1.16	.13	1.17	.17	1.15	.16
High/decreasing (2.6%)	1.70	.25	1.63	.33	1.52	.43	1.48	.37
Model R^2	.30		.28		.22		.23	

	Wave V		Wave VI		Wave VII	
BDP Trajectory Group[a]	*M*	*SD*	*M*	*SD*	*M*	*SD*
Low/stable (A) (42.6%)	1.04	.09	1.05	.10	1.04	.11
Low/stable (B) (35.7%)	1.09	.14	1.06	.11	1.07	.14
Moderate/decreasing (10.2%)	1.10	.14	1.07	.10	1.07	.15
Low/increasing/ slight decrease (8.8%)	1.13	.13	1.13	.16	1.10	.20
High/decreasing (2.6%)	1.44	.44	1.34	.23	1.26	.22
Model R^2	.19		.16		.07	

Notes: Means and standard deviations of summed offending measure, range 1 to 3. [a] BDP = Bonding with Delinquent Peers.

Figure 1: Sample-wide Offending Prior to Dichotomization

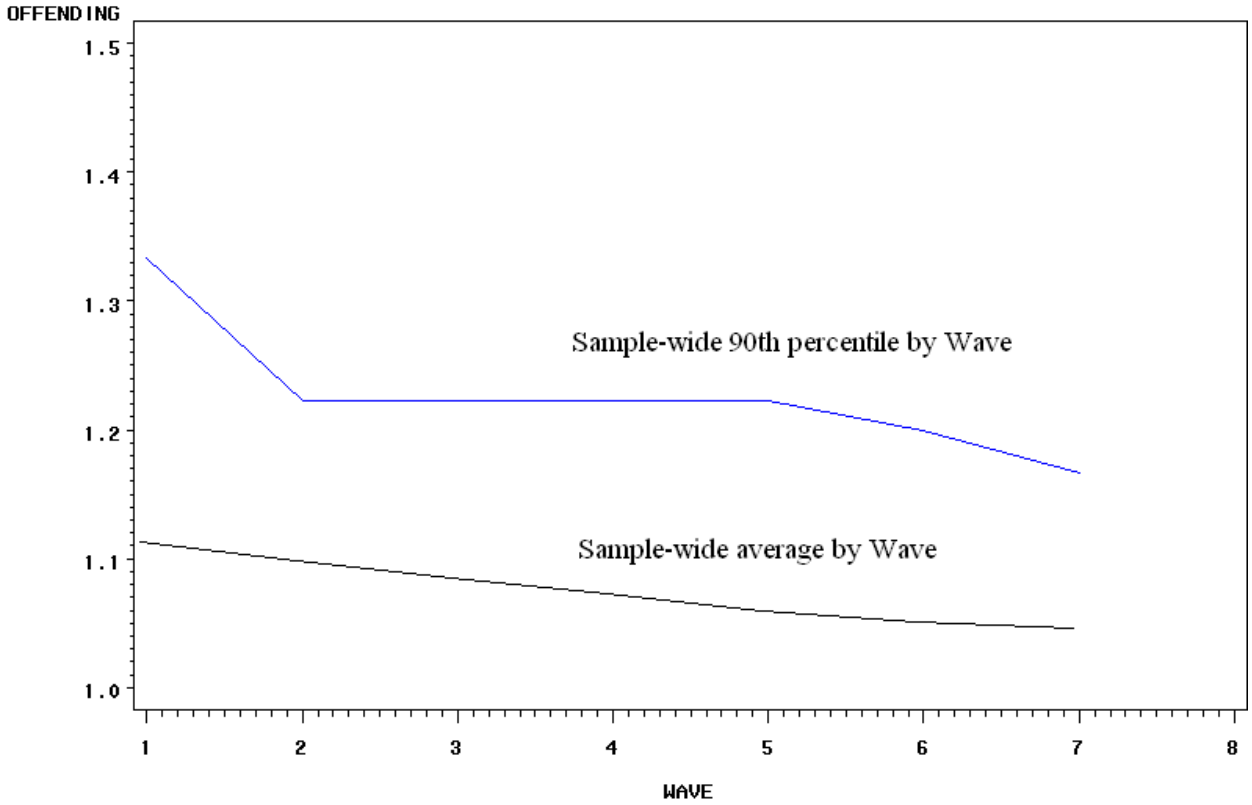
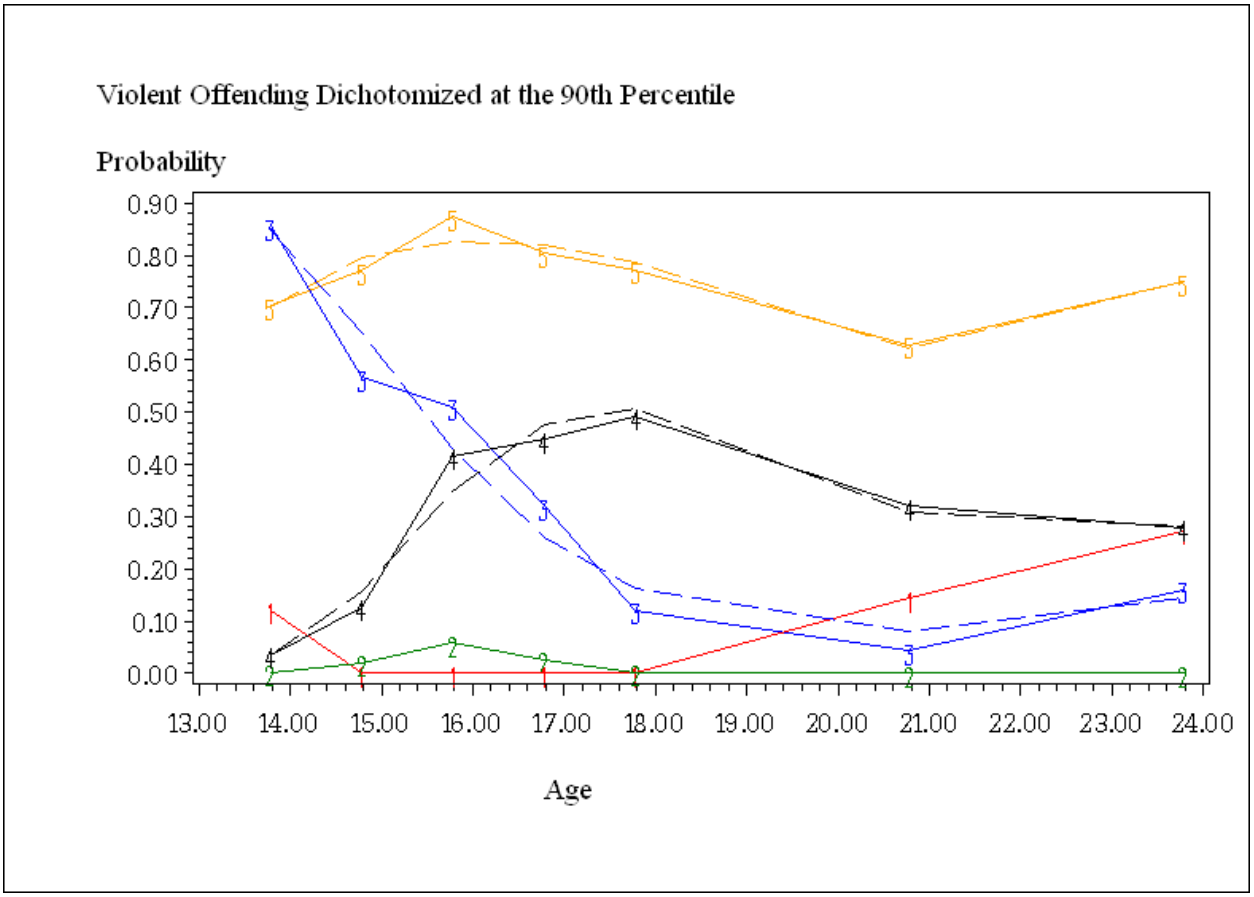
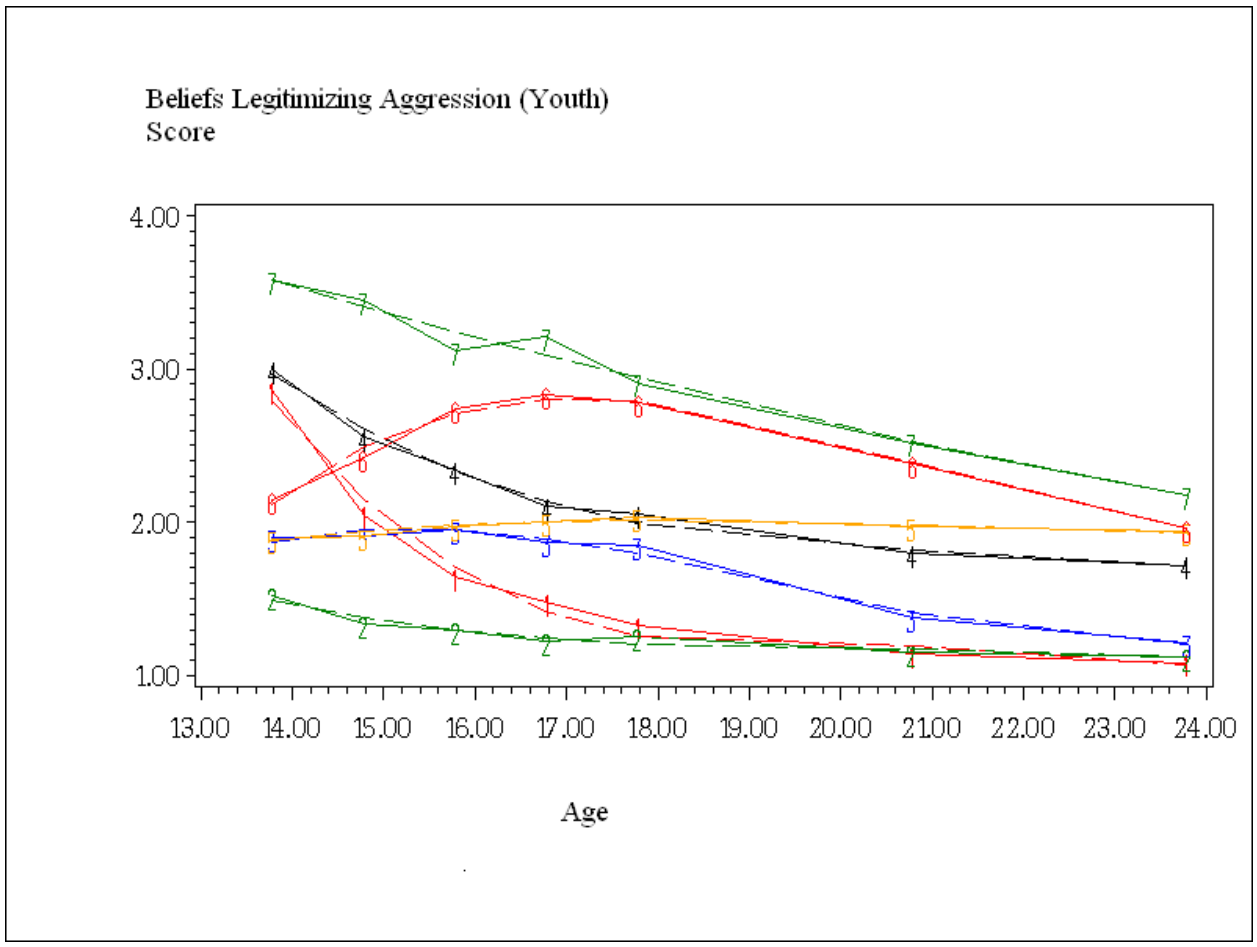


Figure 2: Trajectories of Violent Offending



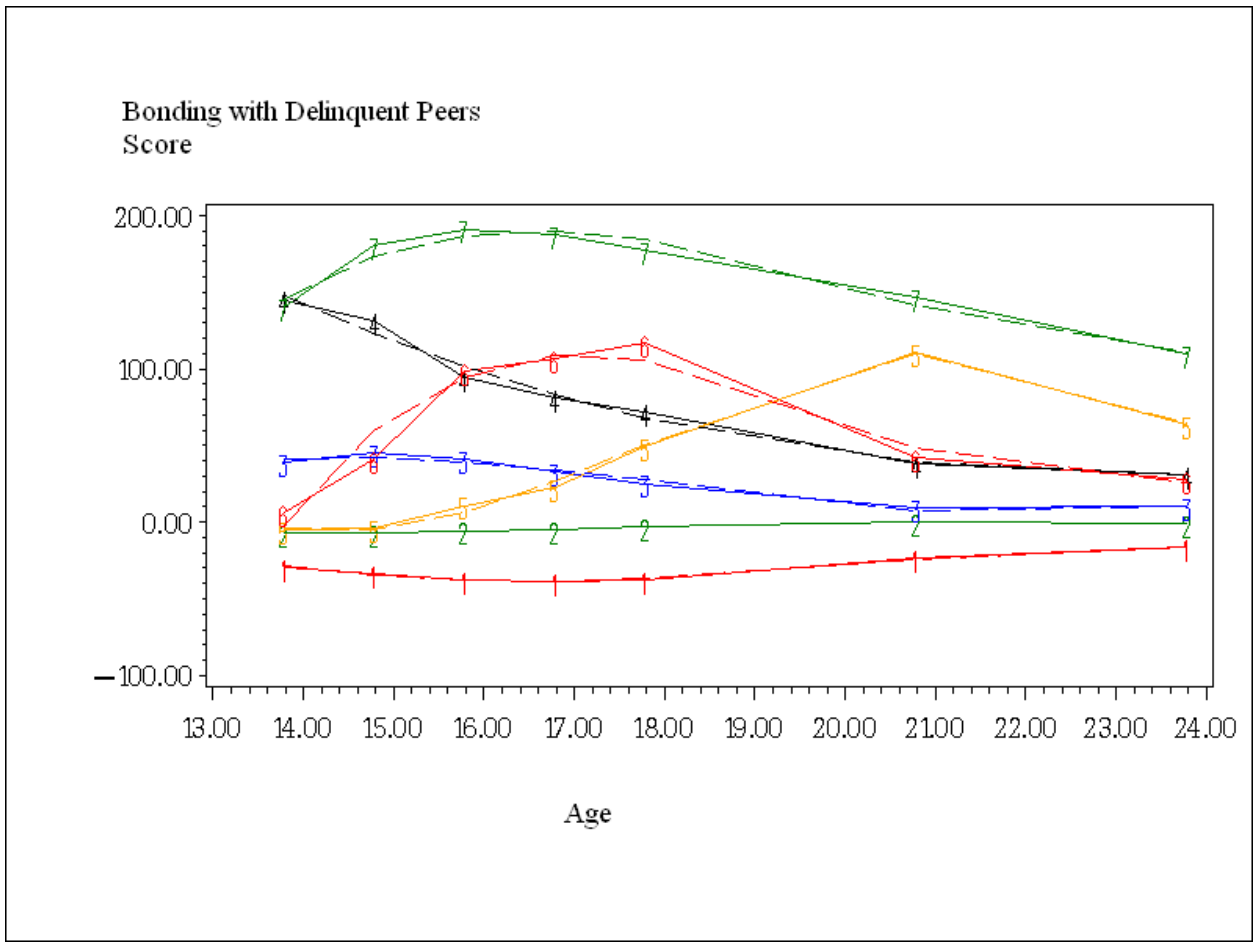
Group 1: *Young adult onset* 11.8% (*n* = 145)
Group 2: *Low/stable* 67.6% (*n* = 829)
Group 3: *Early onset/desister* 3.4% (*n* = 42)
Group 4: *Adolescent onset* 11.9% (*n* = 146)
Group 5: *Early onset/chronic* 5.3% (*n* = 65)

Figure 3: Trajectories of Beliefs Legitimizing Aggression



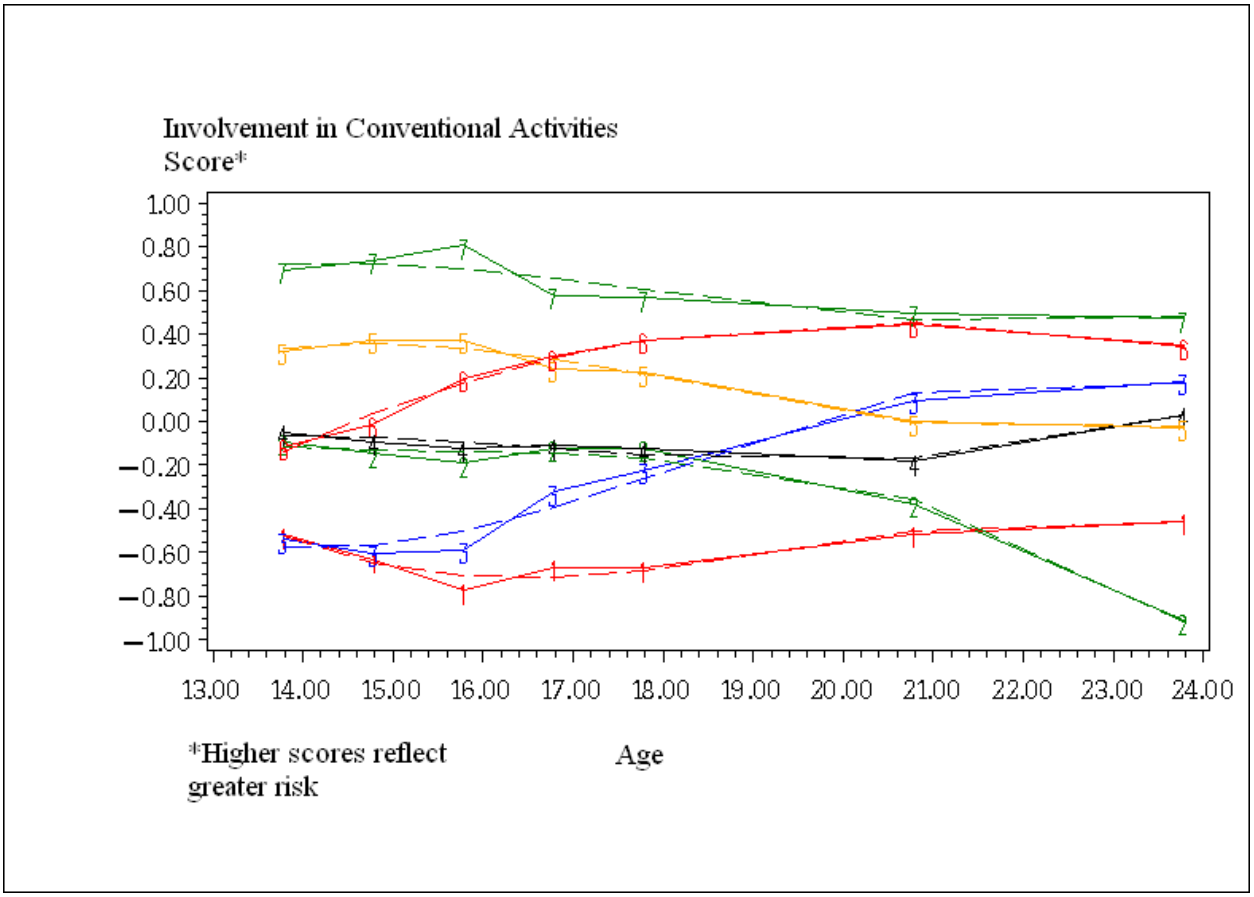
Group 1: *Moderate risk/quick decrease*	3.7%	(*n* = 45)
Group 2: *Low/stable*	27.8%	(*n* = 341)
Group 3: *Low-moderate risk/slow decrease*	26.2%	(*n* = 322)
Group 4: *Moderate risk/slow decrease*	11.0%	(*n* = 135)
Group 5: *Low-moderate risk/stable*	24.8%	(*n* = 304)
Group 6: *Increasing/decreasing*	4.2%	(*n* = 51)
Group 7: *High risk/decreasing*	2.4%	(*n* = 29)

Figure 4: *Trajectories of Bonding with Delinquent Peers*



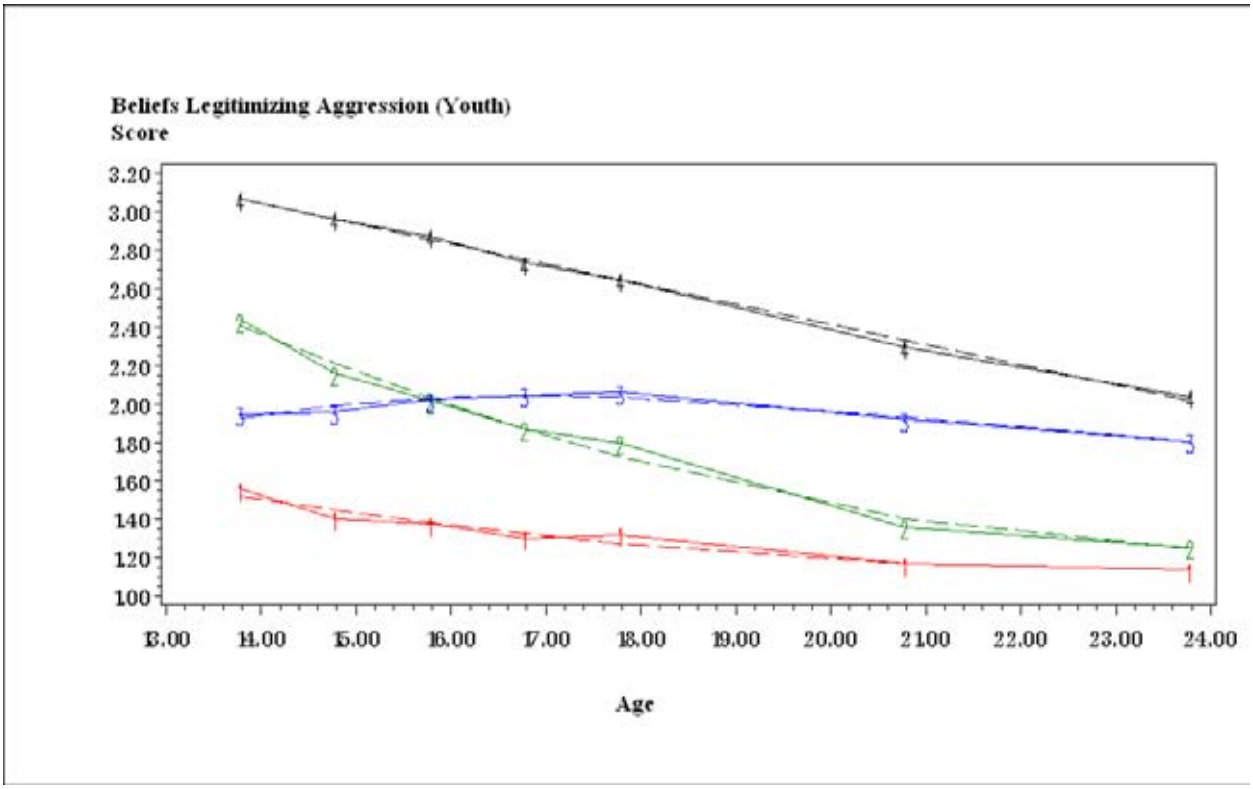
Group 1: *Low/stable (A)*	31.2% (*n* = 383)
Group 2: *Low/stable (B)*	39.0% (*n* = 479)
Group 3: *Moderate/stable*	14.4% (*n* = 177)
Group 4: *High/decreasing*	4.2% (*n* = 52)
Group 5: *Low/increasing/decreasing (A)*	4.4% (*n* = 54)
Group 6: *Low/increasing/decreasing (B)*	5.2% (*n* = 64)
Group 7: *High/slight increase/decrease*	1.5% (*n* = 18)

Figure 5: Trajectories of Involvement in Conventional Activities



Group 1: *Low/stable*	8.0%	(*n* = 98)
Group 2: *Moderate/decreasing*	9.7%	(*n* = 119)
Group 3: *Low/increasing*	12.0%	(*n* = 147)
Group 4: *Moderate/stable*	27.5%	(*n* = 337)
Group 5: *Moderate-high/slight decrease*	21.0%	(*n* = 258)
Group 6: *Moderate/increasing*	12.8%	(*n* = 157)
Group 7: *High/slight decrease*	9.1%	(*n* = 111)

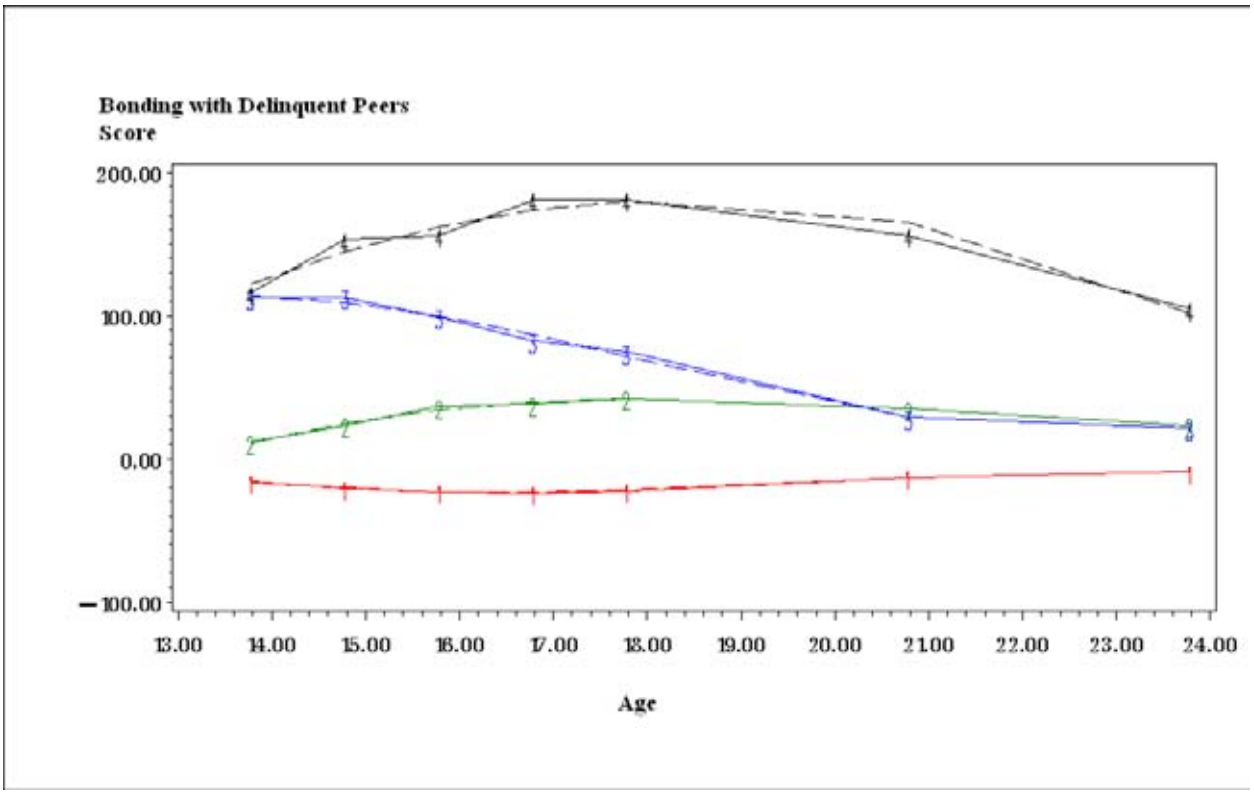
Figure 6: Four-group Trajectory Model for Beliefs Legitimizing Aggression for use in Dual Offending-Risk Model



Group 1: *Low/stable*	22.4%
Group 2: *Moderate/decrease*	25.3%
Group 3: *Moderate/stable*	42.5%
Group 4: *High/decrease*	9.9%*

*Likelihood-based estimates of marginal probability distribution

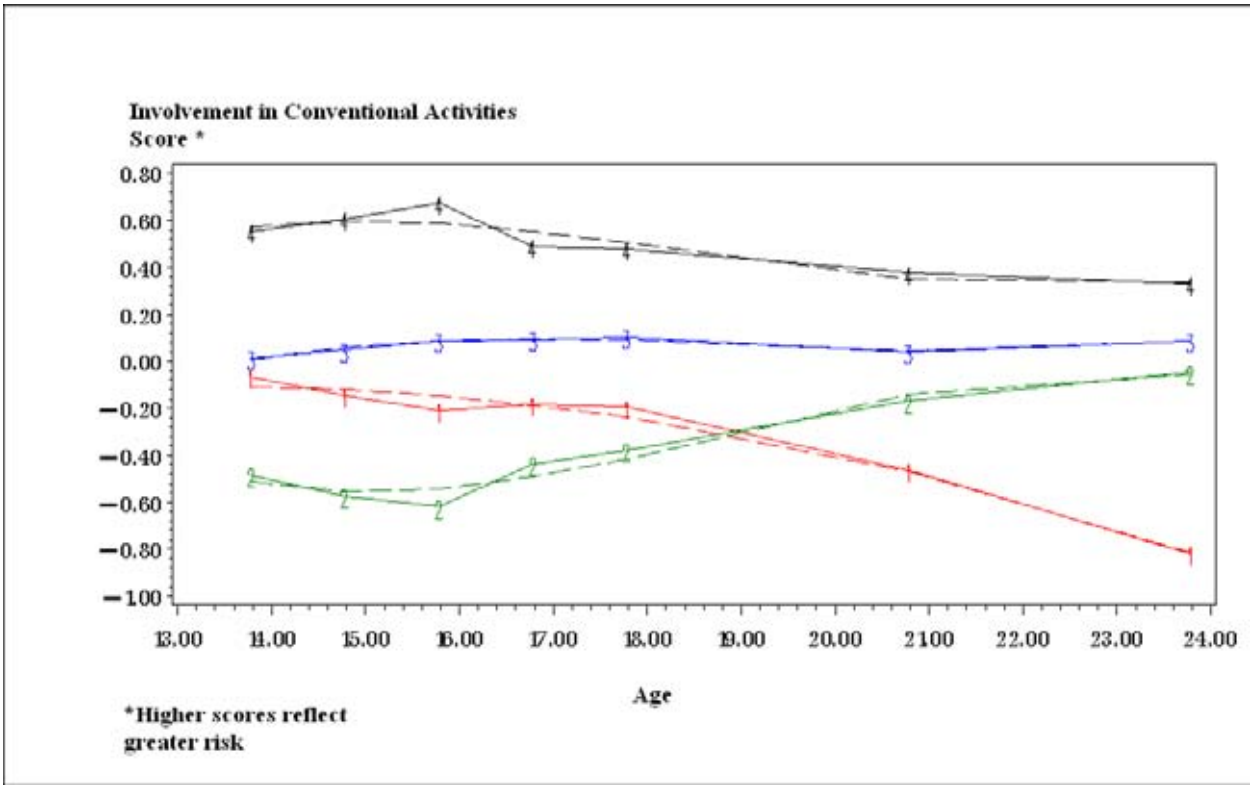
Figure 7: Four-group Model of Bonding with Delinquent Peers for use in Dual Offending-Risk Model



Group 1: *Low/stable*	65.1%
Group 2: *Moderate/stable*	26.3%
Group 3: *High/decrease*	6.8%
Group 4: *High/stable*	1.9%*

*Likelihood-based estimates of marginal probability distribution

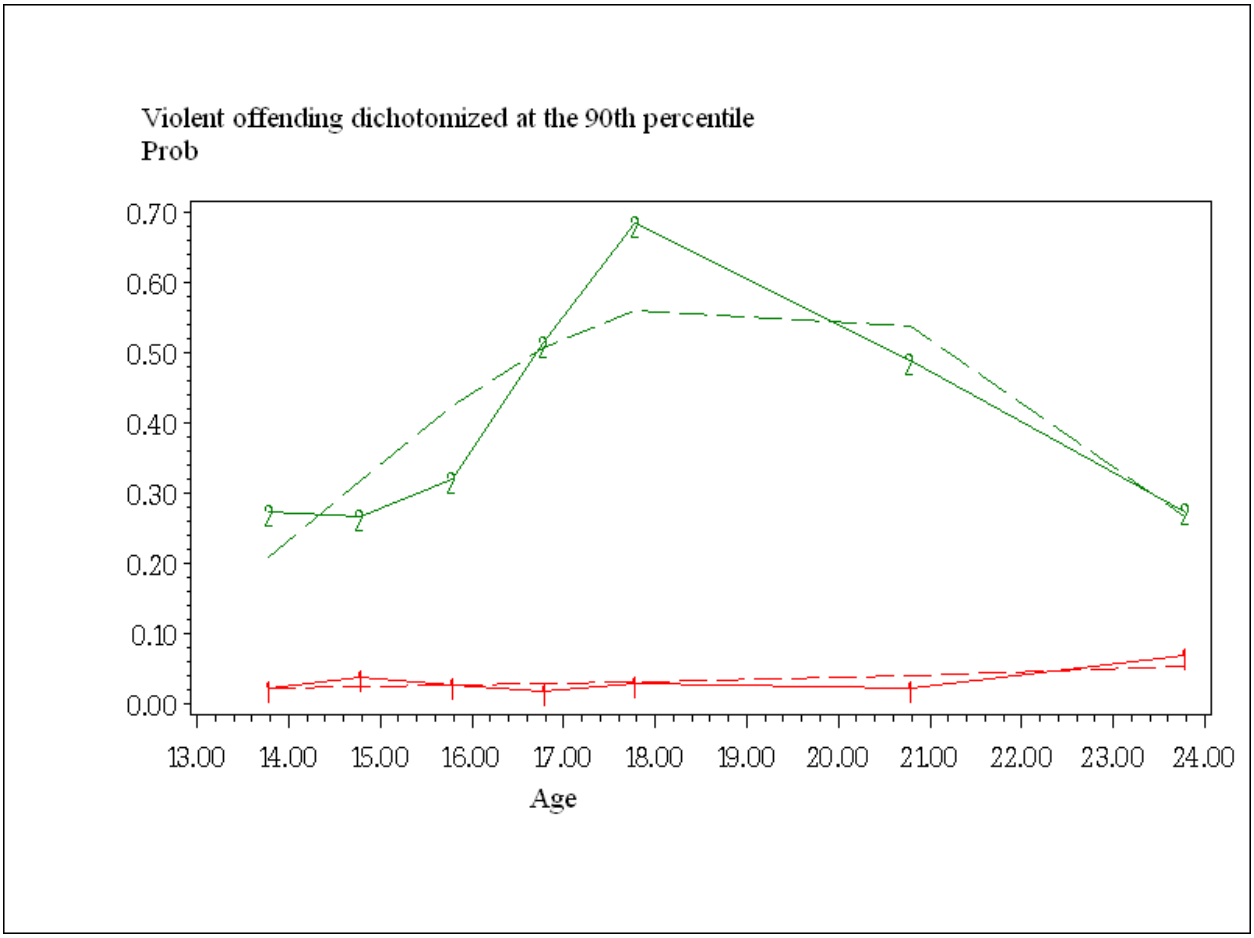
Figure 8: Four-group Model of Involvement in Conventional Activities for use in Dual Offending-Risk Model



Group 1: *Moderate/decrease*	12.6%
Group 2: *Low/increase*	23.3%
Group 3: *Moderate/stable*	46.0%
Group 4: *High/stable*	18.1%*

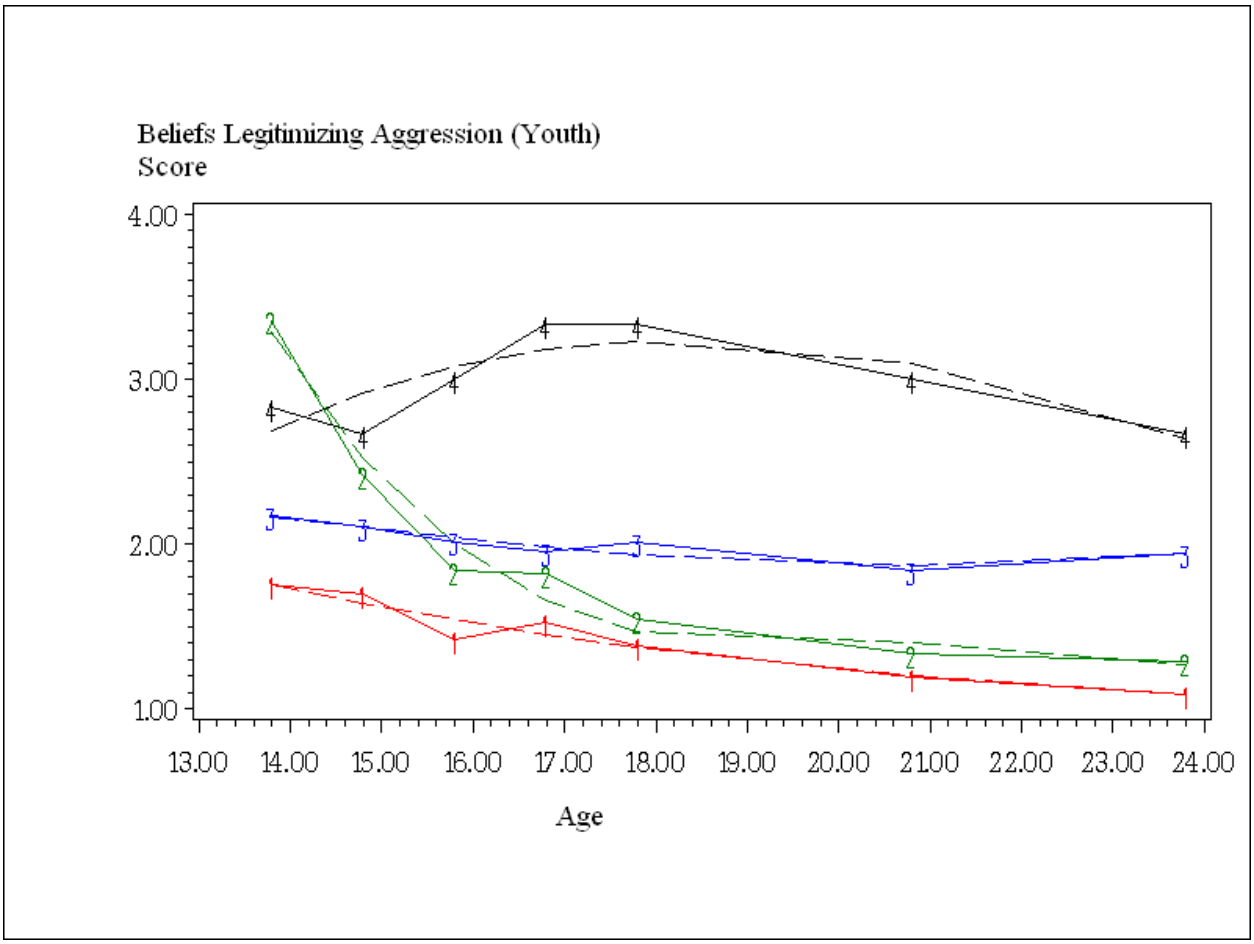
*Likelihood-based estimates of marginal probability distribution

Figure 9: Trajectories of Violent Offending for African American Females (n = 76)



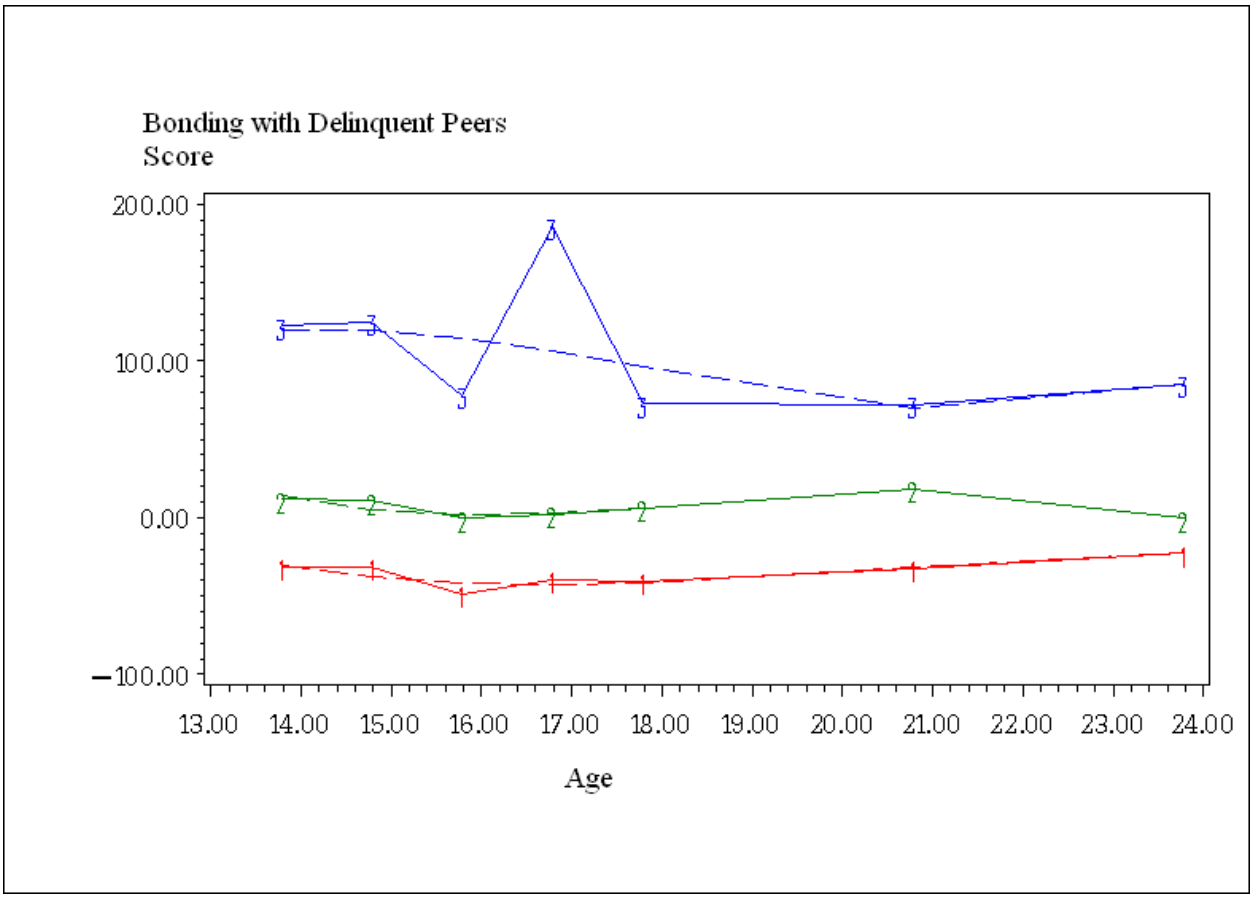
Group 1: *Low/stable* 84.6% (*n* = 64)
Group 2: *Adolescent onset* 15.4% (*n* = 12)

Figure 10: *Trajectories of Beliefs Legitimizing Aggression for African American Females (n = 76)*



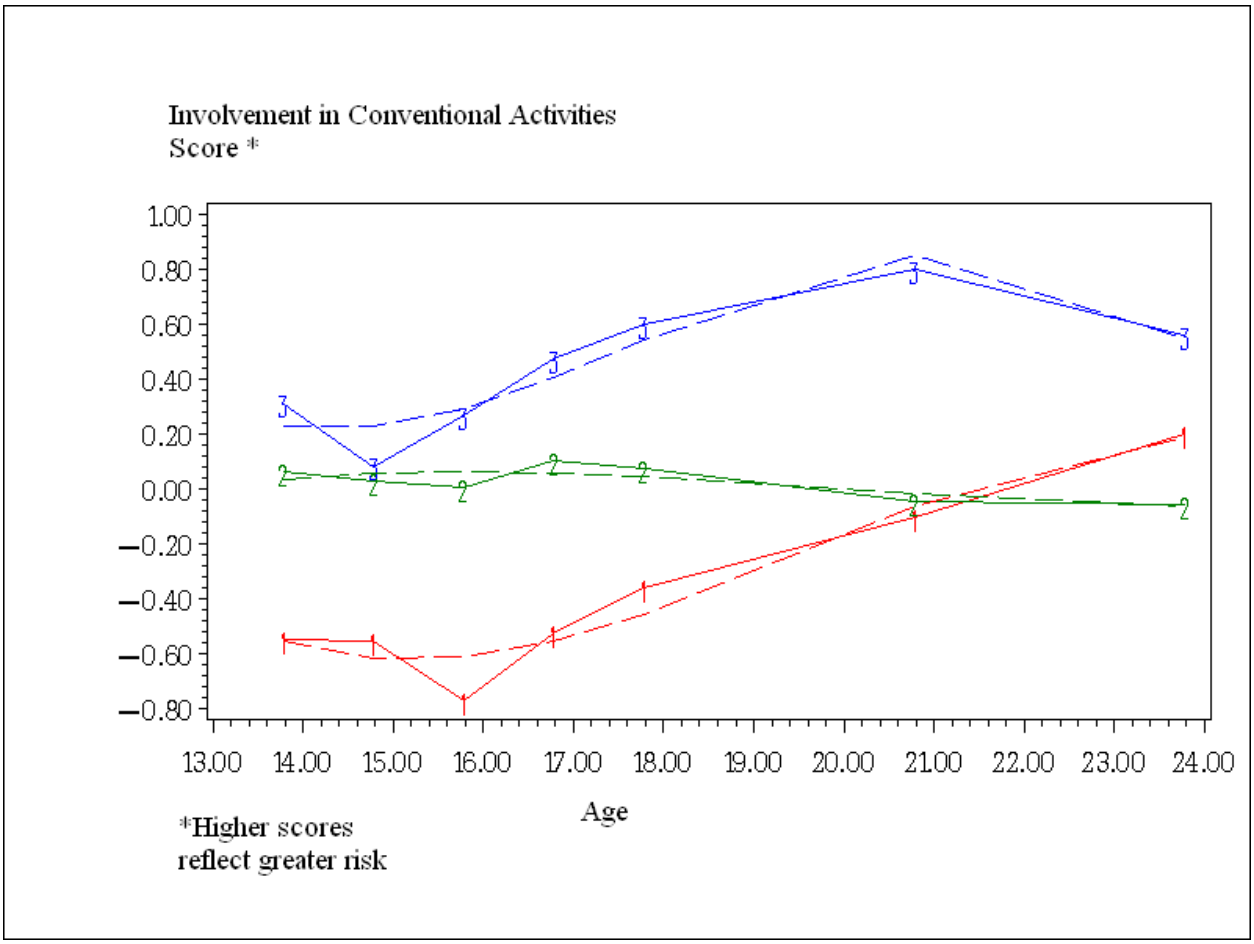
Group 1: *Low/decreasing*	28.9% (*n* = 22)
Group 2: *High/decreasing*	11.8% (*n* = 9)
Group 3: *Moderate/stable*	55.3% (*n* = 42)
Group 4: *High/slight increase/slight decrease*	3.9% (*n* = 3)

Figure 11: Trajectories of Bonding with Delinquent Peers for African American Females (n = 76)



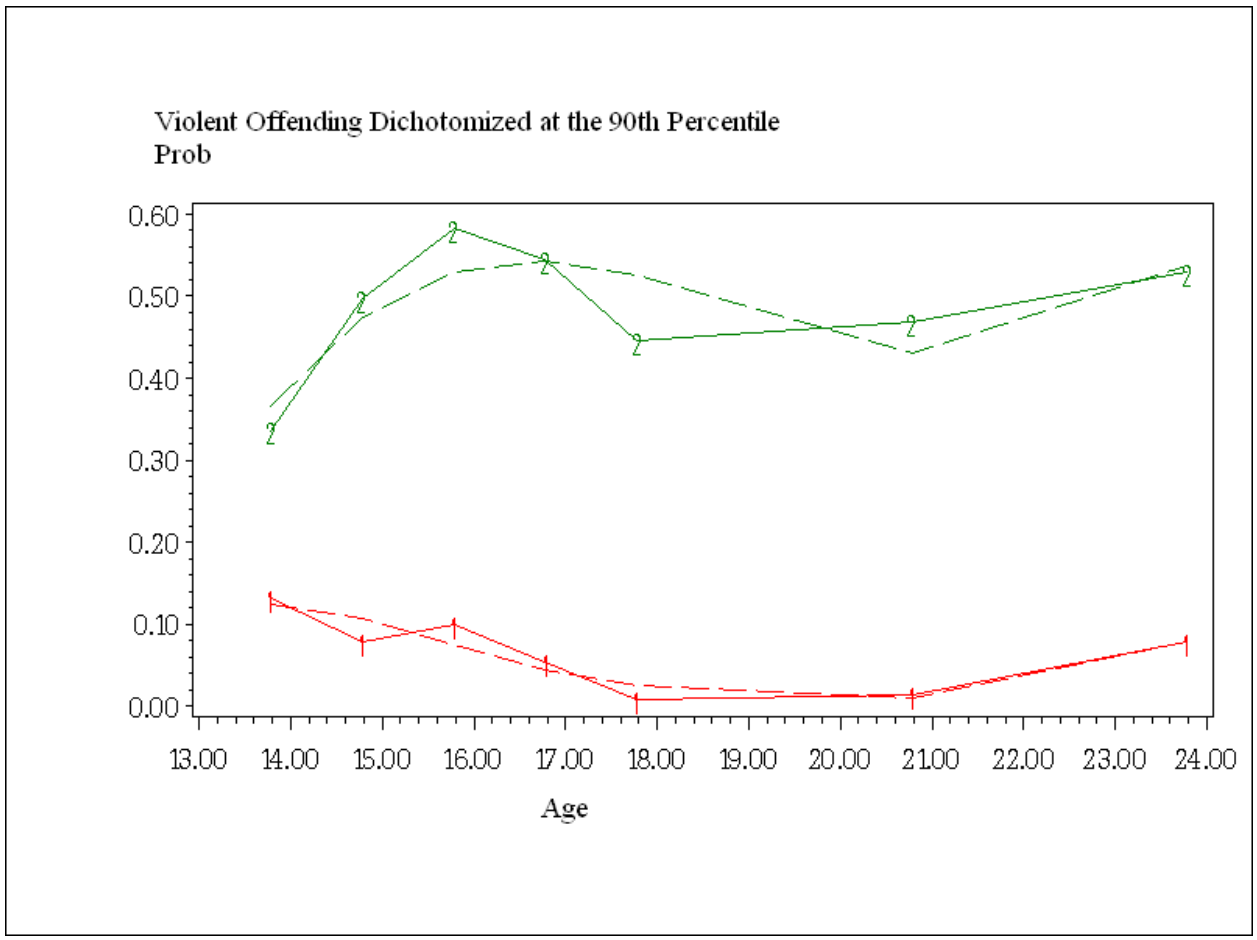
Group 1: *Low/stable* 55.2% (*n* = 42)
Group 2: *Moderate/stable* 40.1% (*n* = 31)
Group 3: *High/slight decrease* 3.9% (*n* = 3)

Figure 12: Trajectories of Involvement in Conventional Activities for African American Females (n = 76)



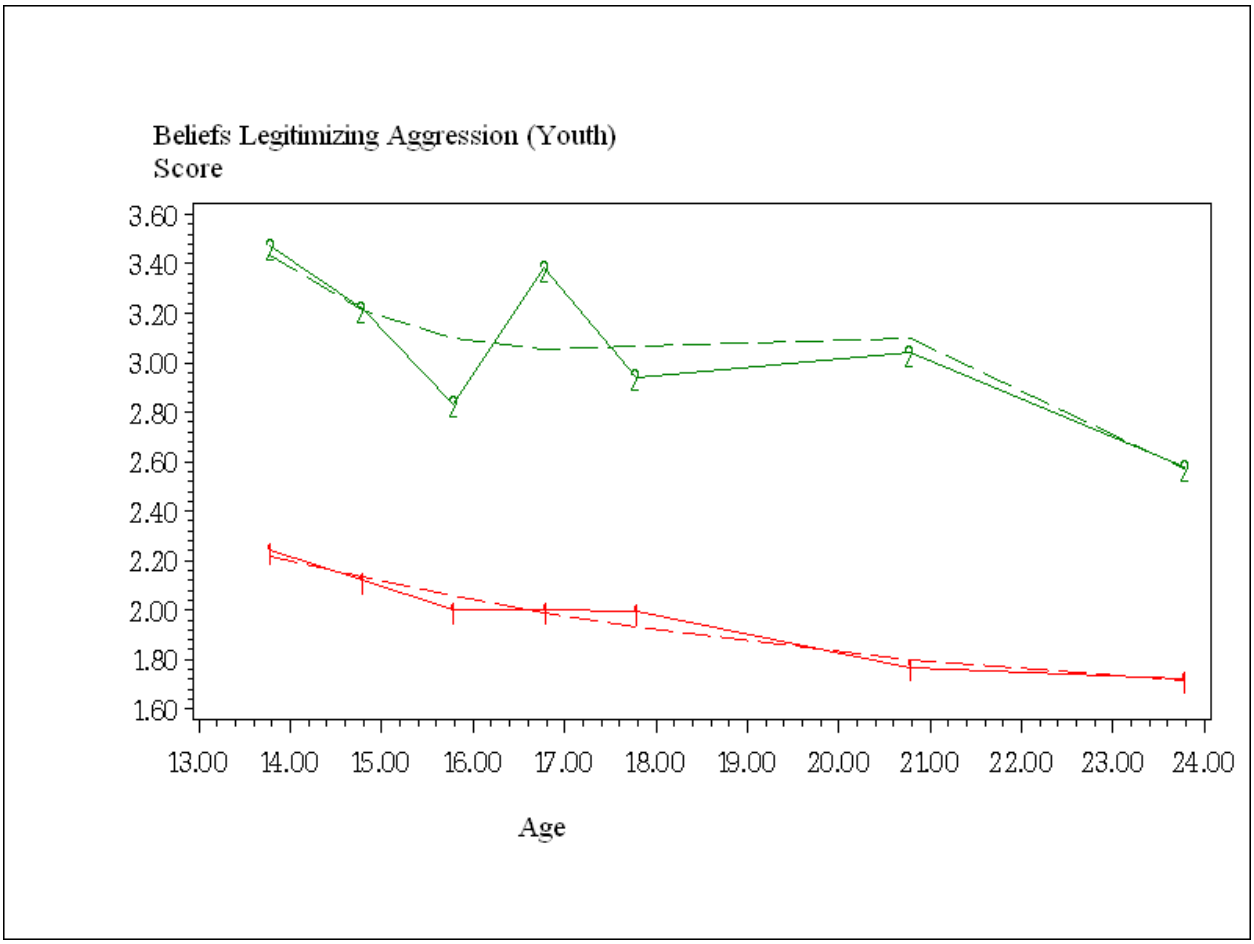
Group 1: *Low/increasing* 25% (*n* = 19)
Group 2: *Moderate/stable* 63.2% (*n* = 48)
Group 3: *Moderate/increasing* 11.8% (*n* = 9)

Figure 13: Trajectories of Violent Offending for African American Males (n =94)



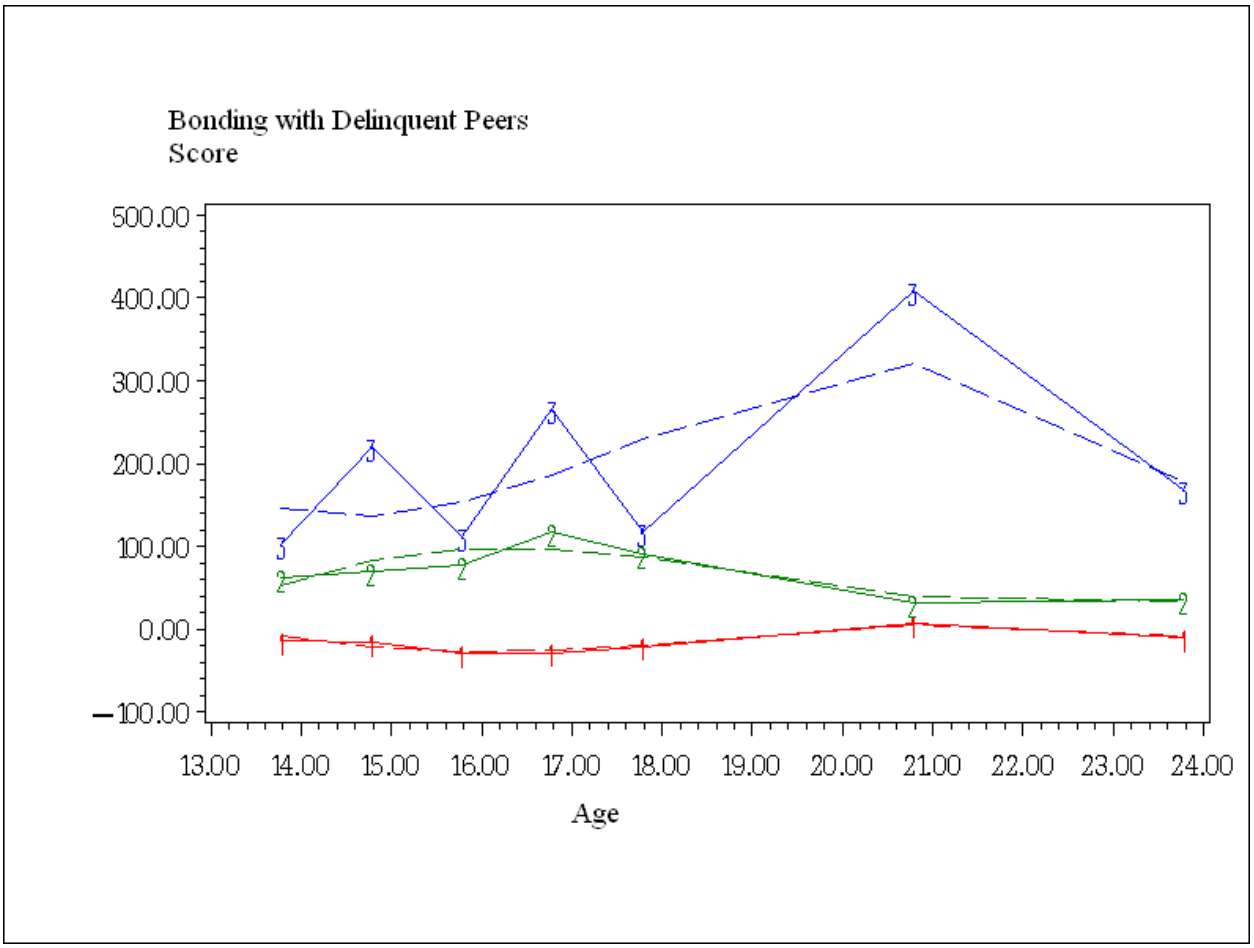
Group 1: *Low/stable* 67.0% (*n* = 63)
Group 2: *Adolescent onset* 33.0% (*n* = 31)

Figure 14: Trajectories of Beliefs Legitimizing Aggression for African American Males (n = 94)



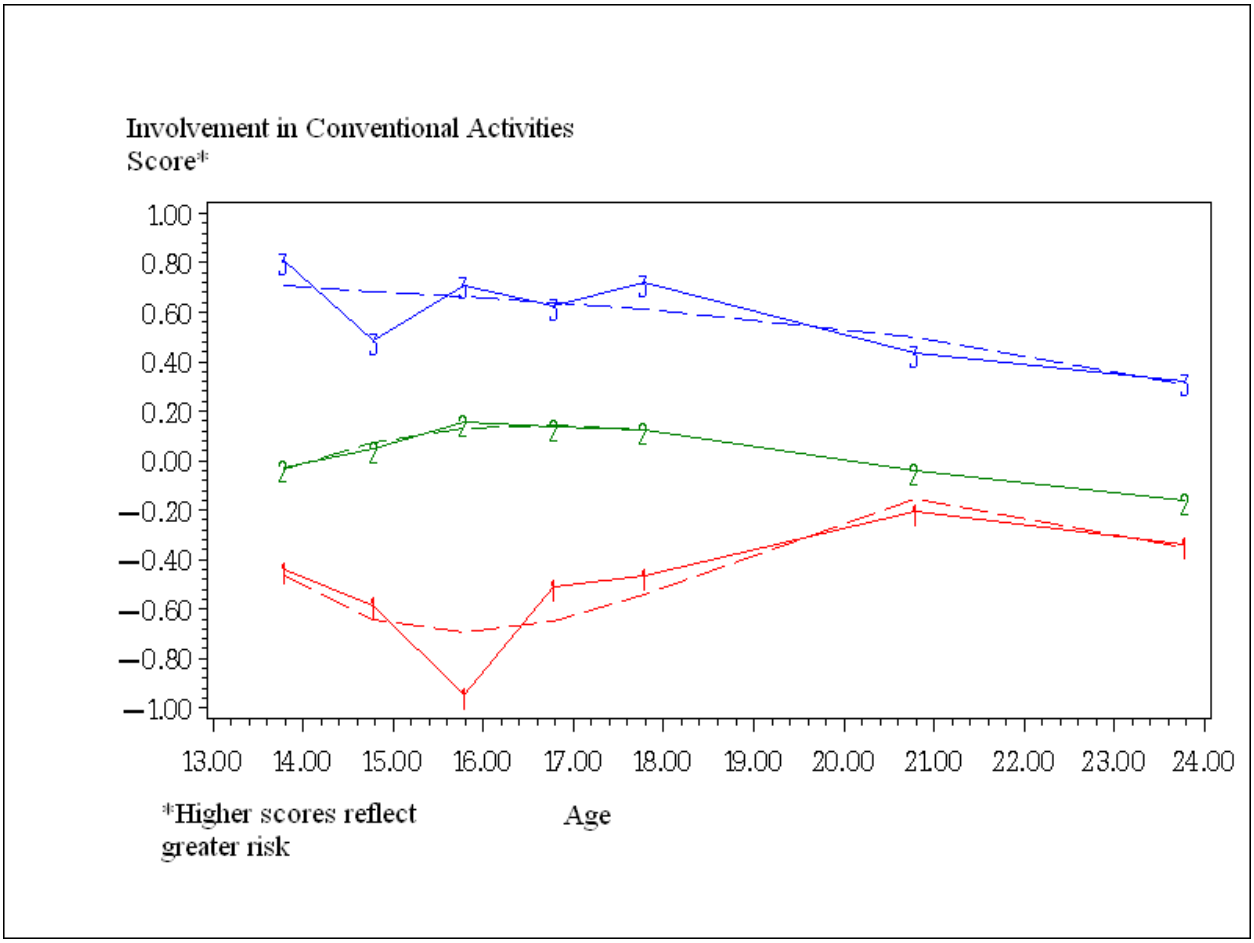
Group 1: *Low/decreasing* 91.5% (*n* = 86)
Group 2: *High/decreasing* 8.5% (*n* = 8)

Figure 15: Trajectories of Bonding with Delinquent Peers for African American Males (n = 94)



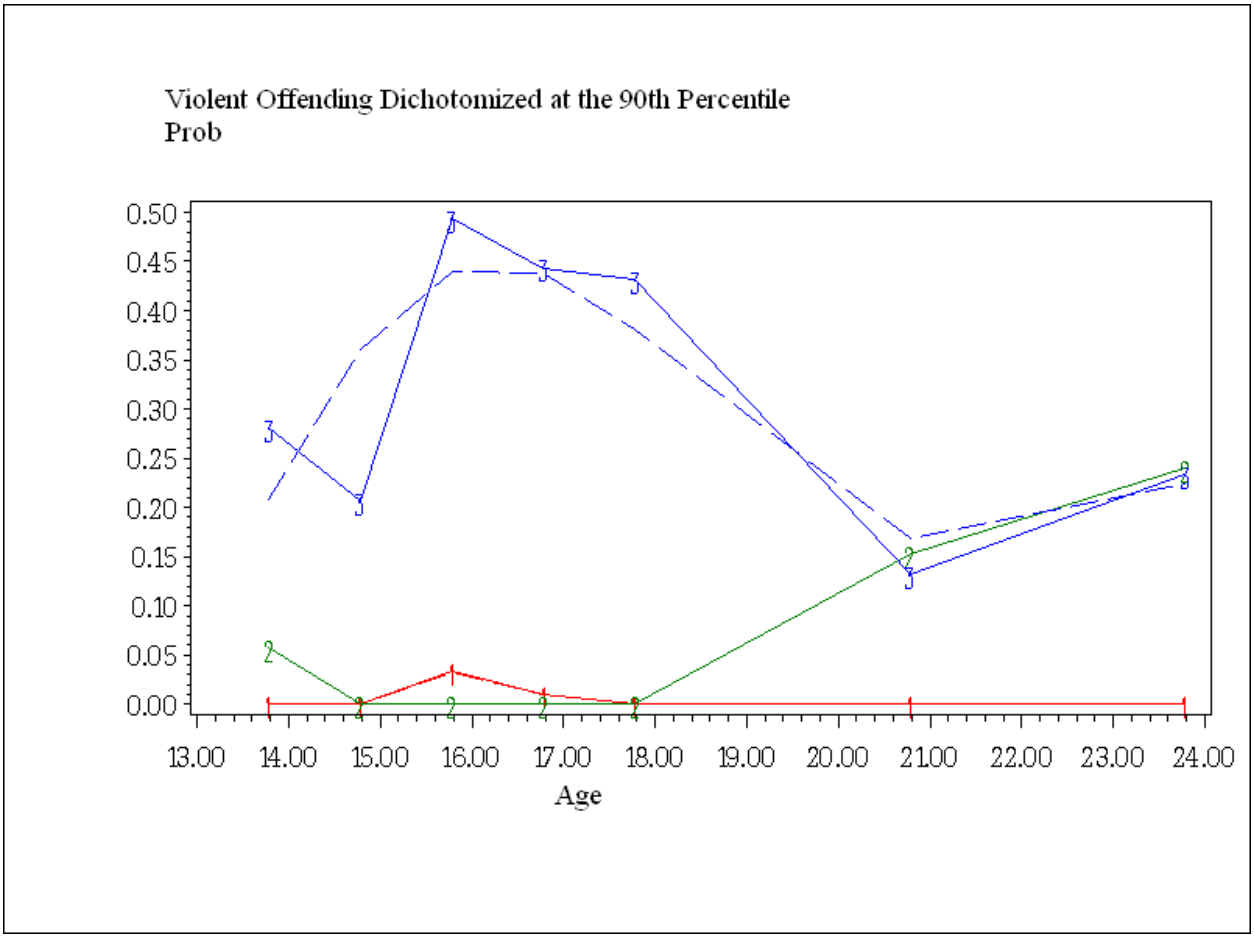
Group 1: *Low/stable* 77.7% (*n* = 73)
Group 2: *Moderate/stable* 20.2% (*n* = 19)
Group 3: *Moderate/increasing/decreasing* 2.1% (*n* = 2)

Figure 16: Trajectories of Involvement in Conventional Activities for African American Males (n = 94)



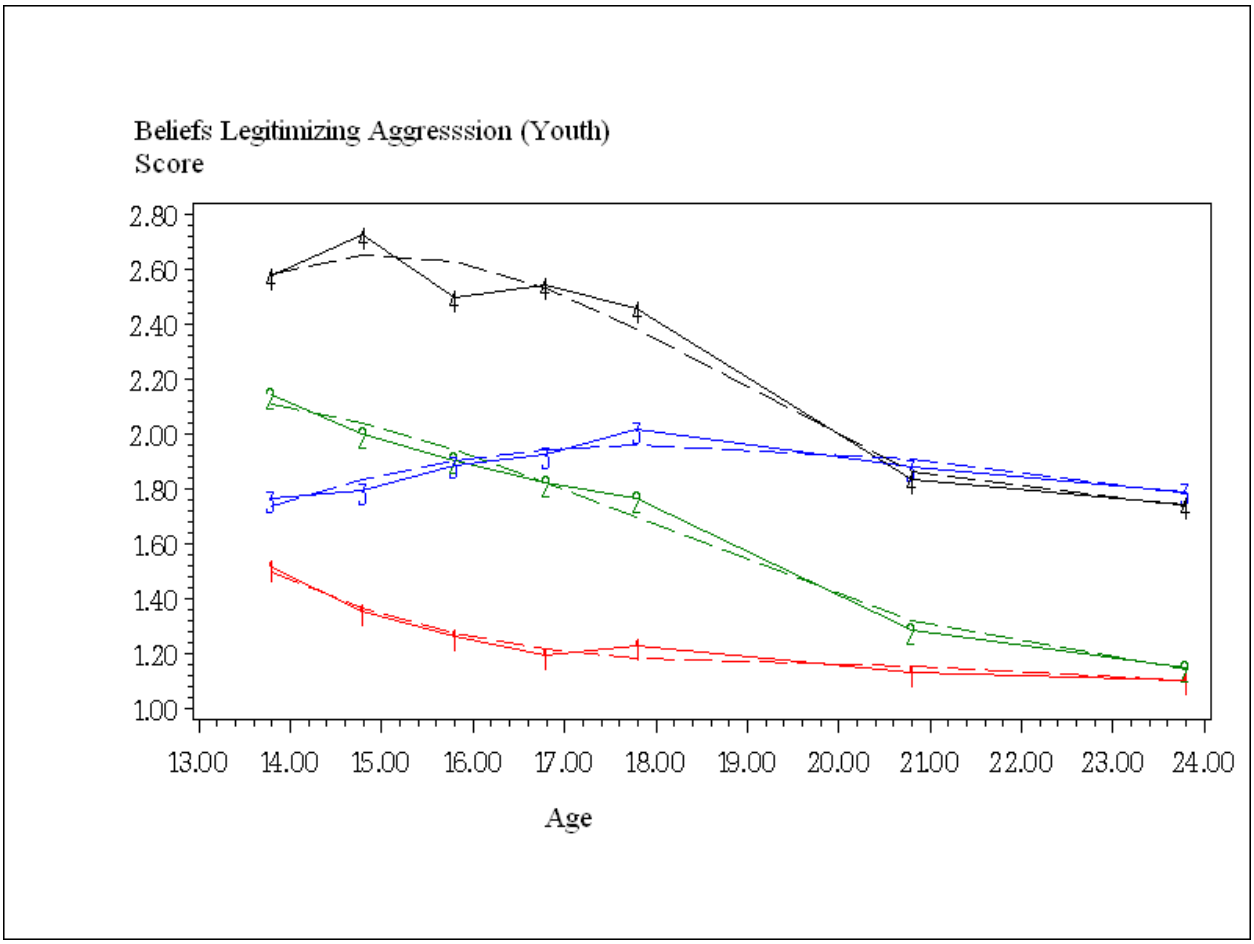
Group 1: *Low/decreasing/increasing* 23.4% (*n* = 22)
Group 2: *Moderate/slight increase/slight decrease* 68.1% (*n* = 64)
Group 3: *High/decreasing* 8.5% (*n* = 8)

Figure 17: Trajectories of Violent Offending for White Females (n =509)



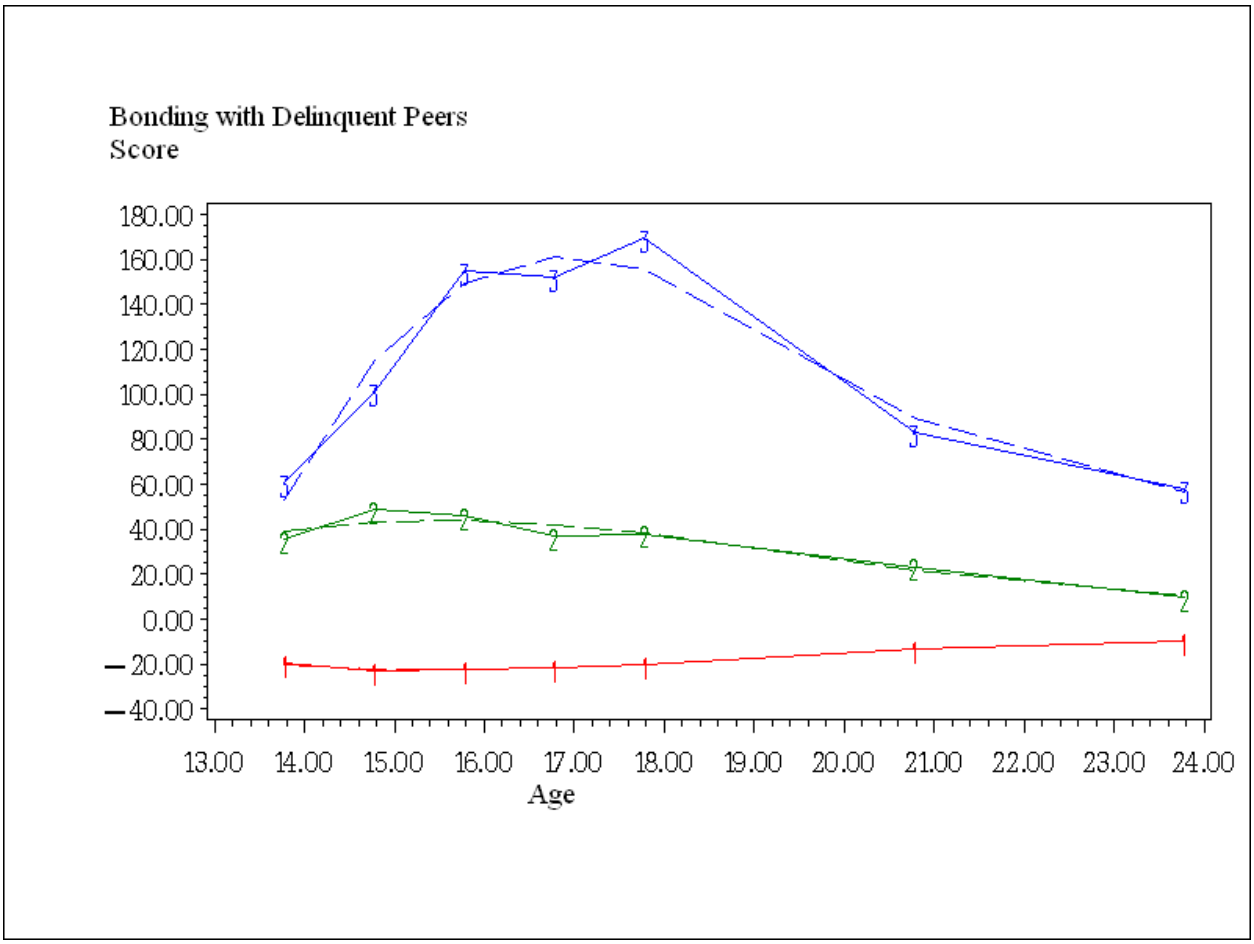
Group 1: *Low/stable* 81.1% (*n* = 413)
Group 2: *Young adult onset* 9.2% (*n* = 47)
Group 2: *Adolescent onset* 9.6% (*n* = 49)

Figure 18: Trajectories of Beliefs Legitimizing Aggression for White Females (n =509)



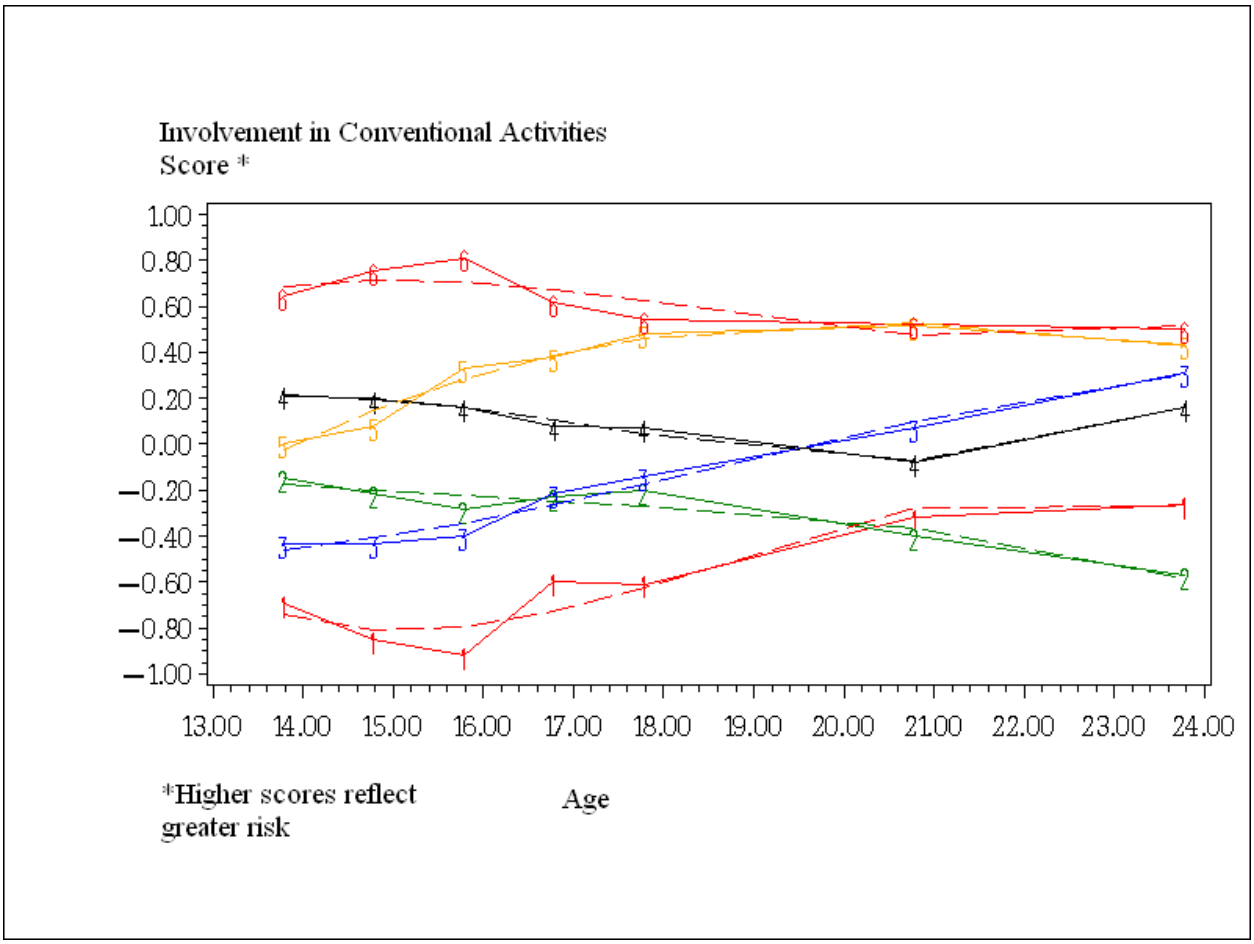
Group 1: *Low/decreasing* 44.6% (*n* = 227)
Group 2: *Moderate/decreasing* 29.7% (*n* = 151)
Group 3: *Moderate/slight increase* 19.4% (*n* = 99)
Group 4: *High/decreasing* 6.3% (*n* = 32)

Figure 19: Trajectories of Bonding with Delinquent Peers for White Females (n =509)



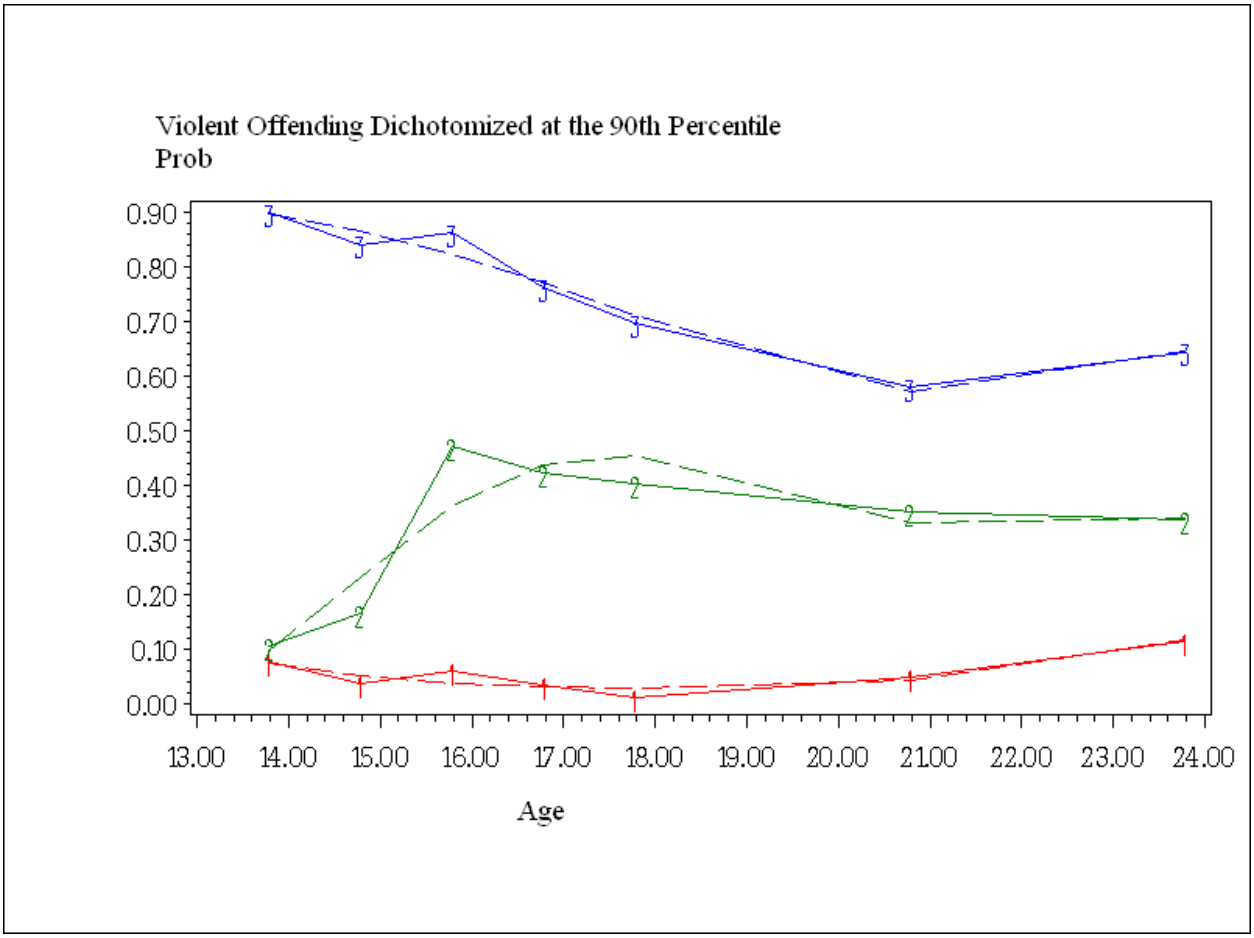
Group 1: *Low/slight increase* 77.0% (*n* = 392)
Group 2: *Moderate/slight decrease* 20.8% (*n* = 106)
Group 3: *Moderate/increasing/decreasing* 2.2% (*n* = 11)

Figure 20: Trajectories of Involvement in Conventional Activities for White Females (n =509)



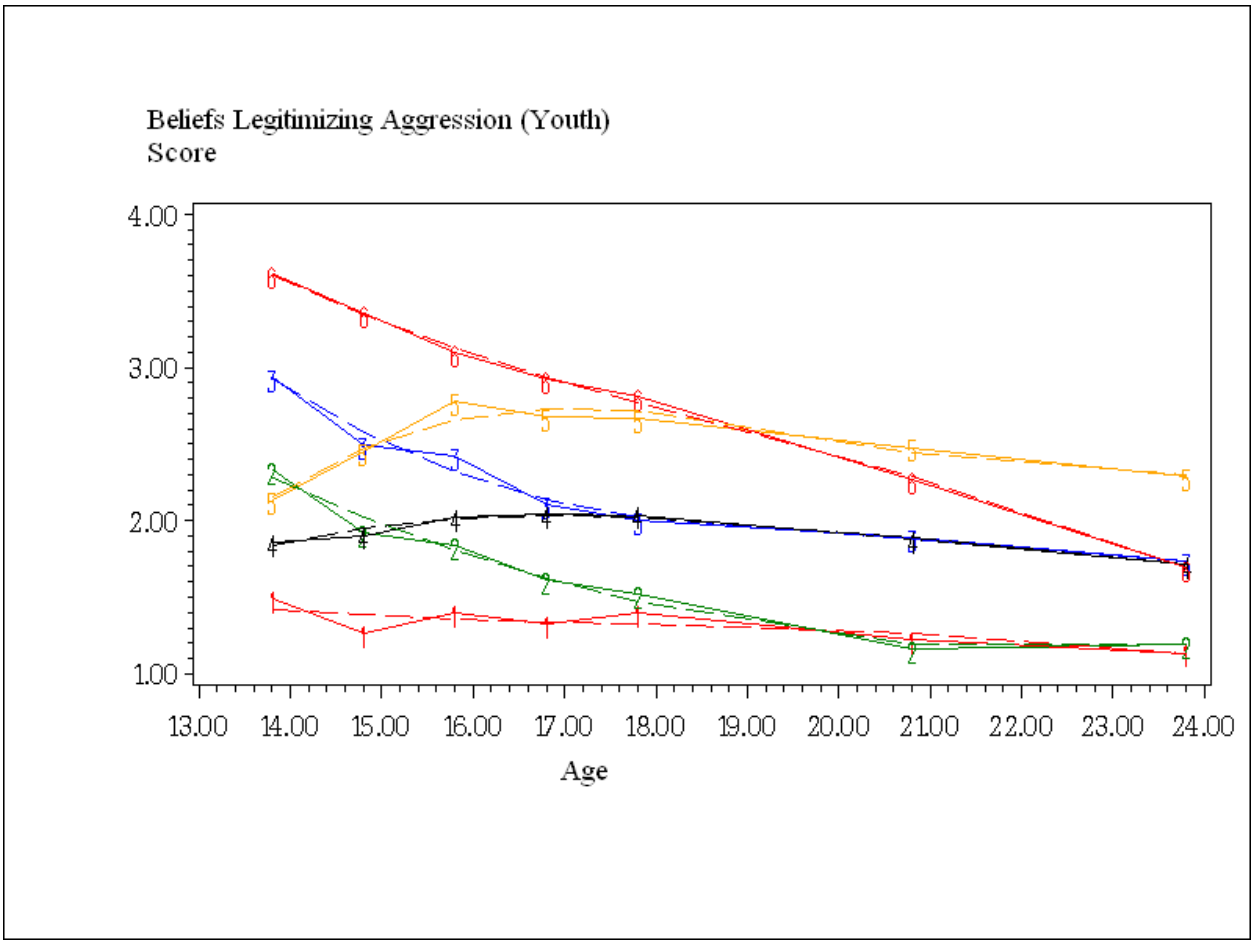
Group 1: *Low/increasing* 6.9% (*n* = 35)
Group 2: *Moderate/slight decrease* 17.1% (*n* = 87)
Group 3: *Low-moderate/increasing* 22.6% (*n* = 115)
Group 4: *Moderate/slight decrease/increase* 25.5% (*n* = 130)
Group 5: *Moderate/increasing* 17.7% (*n* = 90)
Group 6: *High/stable* 10.2% (*n* = 52)

Figure 21: Trajectories of Violent Offending for White Males (n =488)



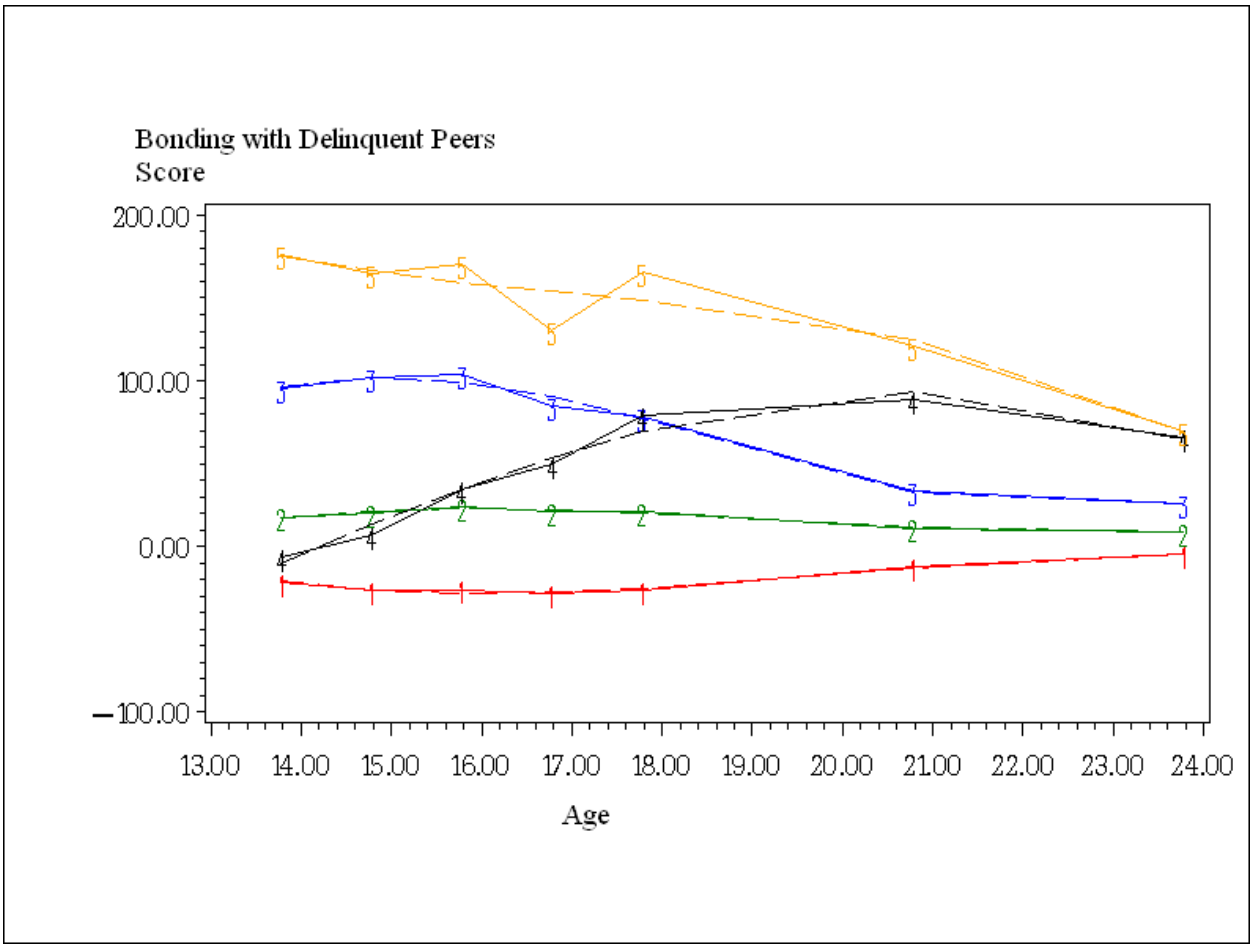
Group 1: *Low/stable* 70.1% (*n* = 345)
Group 2: *Adolescent onset* 19.3% (*n* = 94)
Group 3: *Early onset/moderate decrease* 10.0% (*n* = 49)

Figure 22: Trajectories of Beliefs Legitimizing Aggression for White Males (n =488)



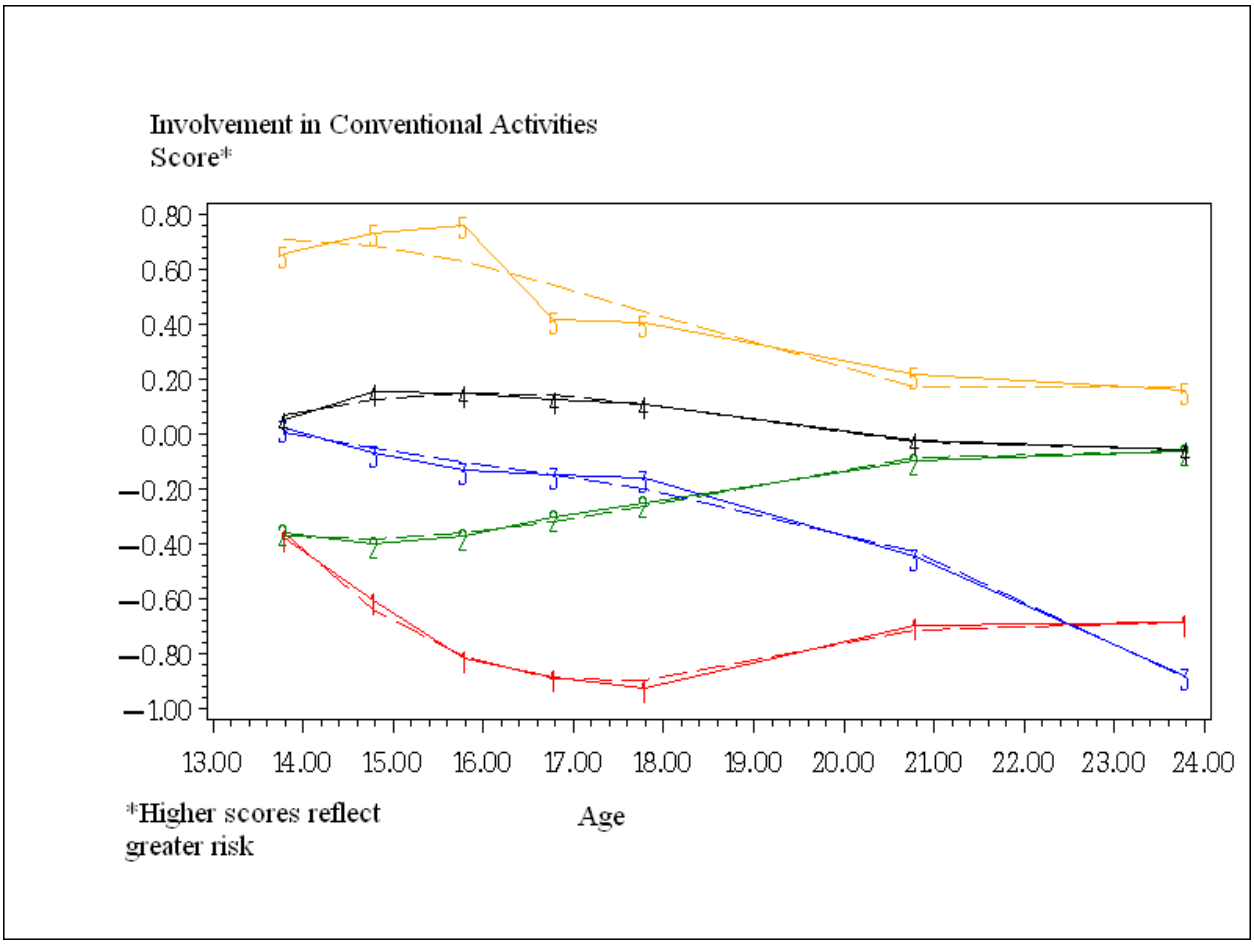
Group 1: *Low/stable*	17.2%	(*n* = 84)
Group 2: *Moderate/decreasing*	11.9%	(*n* = 58)
Group 3: *Moderate-high/decreasing*	14.5%	(*n* = 71)
Group 4: *Moderate/stable*	46.7%	(*n* = 228)
Group 5: *Moderate/increasing/decreasing*	5.5%	(*n* = 27)
Group 6: *High/decreasing*	4.1%	(*n* = 20)

Figure 23: Trajectories of Bonding with Delinquent Peers for White Males (n =488)



Group 1: *Low/stable (A)*	42.6% (*n* = 208)
Group 2: *Low/stable(B)*	35.7% (*n* = 174)
Group 3: *Moderate/decreasing*	10.2% (*n* = 50)
Group 4: *Low/increasing/slight decrease*	8.8% (*n* = 43)
Group 5: *High/decreasing*	2.6% (*n* = 13)

Figure 24: Trajectories of Involvement in Conventional Activities for White Males (n =488)



Group 1: *Low/decreasing/increasing* 4.9% (*n* = 24)
Group 2: *Low/slight increase* 29.1% (*n* = 142)
Group 3: *Moderate/decreasing* 8.8% (*n* = 43)
Group 4: *Moderate/stable* 39.8% (*n* = 194)
Group 5: *High/decreasing* 17.4% (*n* = 85)