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Childhood Behavior and Adult Criminality: Cluster Analysis in a Prospective Study of African Americans

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Abstract

Adult criminality has important roots in childhood. While many studies have established that multiple problem behaviors in childhood increase the likelihood of future crime and deviance, the current study extends this “established” relationship by asking three questions: (1) Do different *combinations* of childhood behavioral risk factors affect adult offending? (2) Do family risk factors affect adult offending above and beyond these combinations of risks?, and (3) Are there gender differences present with respect to these two questions? Gender-specific cluster analyses identified seven clusters of childhood behavioral patterns based on teacher ratings measured in first grade among an epidemiologically-defined cohort of African Americans. Multinomial logistic regression analyses were utilized to examine the relationship of cluster membership, family risks, and criminal arrests through age 32 for serious violent and property crimes. While some gender differences emerged, both males and females in the multiple problem cluster were more likely to have later arrests for serious crime. Females who were frequently punished as first graders were most likely to have later arrests for serious crimes, while males who were from mother-only families were at higher risk of having serious criminal arrests compared to those from mother-father families. Implications for prevention and intervention strategies are also discussed.

Keywords

Childhood behavioral problems; Criminal arrests; Cluster analysis; Longitudinal study; African Americans; Gender differences; Parental punishment; Family type; Violence

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Introduction

Over the past 50 years, it has become a well-established finding in criminology that "the past is prologue" (see, e.g., Glueck and Glueck 1950). The empirical finding that childhood problem behavior is predictive of adult problem behavior has been documented in several longitudinal samples, regardless of time, place, sample characteristics, or specific measures of outcome. For instance, Robins (1978) studied four samples of individuals: white child-guidance clinic patients from the 1920s, young black men in the 1940s, and Vietnam veterans and matched non-veterans from the 1960s. The results on the continuity of antisocial behavior indicate that "adult antisocial behavior virtually *requires* childhood antisocial behavior" (p. 611, emphasis in original). Similarly, Tremblay et al. (2003) found that boys who were physically aggressive and oppositional in adolescence also had displayed oppositional and aggressive behaviors in childhood. This pattern emerges for officially-defined problem behavior as well. For instance, in both of the Philadelphia Birth Cohorts (1945 and 1958), a subject's delinquency status was the most important predictor of adult criminality (Wolfgang et al. 1972; Tracy and Kempf-Leonard 1996). Taken together, although the relationship between childhood and adult behavior is not perfect and change in behavior over time also occurs, continuity between childhood behavior and later behavior has become one of the few "knowns" in criminology (see also, Robins 1966; West and Farrington 1977; Loeber 1982; McCord 1983; White et al. 1990; Brook et al. 1992; Patterson et al. 1992; Sampson and Laub 1993; Lahey et al. 1999; Loeber et al. 2004).

A variety of childhood problem behaviors have repeatedly been targeted as risk factors for later deviance. However, there is a paucity of research which systematically investigates how various combinations of these behavioral indicators within the same individual predict offending outcomes into adulthood. Thus, the current study extends the "established" relationship between childhood problem behavior and later crime and deviance by asking three questions: (1) Do different combinations of childhood behavioral risk factors affect adult offending? (2) Do family interactions and/or resources, also well-established childhood risk factors of antisocial behavior, affect adult offending above and beyond these combinations of risks?, and (3) Are there gender differences present with respect to these two questions? To begin, we briefly address the literature regarding the key childhood behavioral and family risk factors that lead to crime and delinquency and the existing research on gender differences before discussing the analytical strategy of the study.

Childhood Risk Factors

Borrowing from public health and medicine, the risk-factor paradigm has become a popular approach to examining the longitudinal patterns of crime and delinquency (Farrington 2000). Two key categories of developmental risk factors for crime and delinquency are individual characteristics such as childhood disruptive behavior (e.g. opposition, impulsivity, hyperactivity and aggression) and family characteristics (e.g. parental deviance, family type, parental rejection, parental discord, ineffective discipline, and poor supervision) (Farrington 1989, 1991; Hawkins et al. 1991, 1998; Lipsey and Derzon, 1998; Reiss and Roth 1993; McCord 1994; Tremblay and Craig 1995; Rutter et al. 1998; Tremblay 2000).

Developmentally, childhood disruptive behaviors may indicate an underlying behavioral disposition that continues to manifest itself as disruptive behavior throughout childhood and as delinquent and criminal behavior into adolescence and adulthood. These disruptive behaviors may also initiate negative interactions with peers and authority figures in school and at home facilitating the continuation of these behaviors. The family also plays an important role. Those in families with rejecting parents or parents who impose harsh or inconsistent punishment are most likely to be delinquent (Sampson and Laub 1993; Patterson 1995; Tremblay and Craig 1995; McCord and Ensminger 1997; Farrington and Loeber 1998; Loeber et al. 2004). Family resources such as family size and structure, family income and maternal education have also been related to later violence (McCord 1994). In their reanalysis of the Glueck delinquents and nondelinquents, Laub and Sampson (1988) found that family process variables such as parental discipline practices and maternal attachment were the most important predictors of serious delinquency. In addition, they found that background factors such as residential mobility and family income had an indirect effect on serious delinquency through these family process variables.

Cumulative Risk

One sturdy finding from risk-factor research is that risk factors tend to cluster in the same individual and that those with multiple risk factors are the most negatively affected when compared to those with fewer risk factors (Rutter 1979). Some recent examples include the longitudinal research from the Denver Youth Survey and the Pittsburgh Youth Survey which reveal an increase in the probability of violent, serious, and/or persistent offending as the number of risk factors a person experiences increases (Huizinga et al. 2003; Loeber et al. 2003). Overall, the consensus seems to be that risk factors do not appear to function as independent entities separable from the web of influences in which they occur.

Moreover, a few studies have identified different risk combinations as key correlates of later problems as opposed to a mere sum of risk factors. For instance, several studies have shown that while shy behavior alone is protective, when it exists in combination with aggressive behavior, it is detrimental in its impact (Kellam et al. 1983; Block et al. 1988; McCord 1988; Moskowitz and Schwartzman 1989; Pulkkinen and Tremblay 1992; Kerr et al. 1997). Using a person-oriented approach, Tremblay et al. (2003, p. 211) found that in their study of boys in Montreal, “the kindergarten boys most at risk of early delinquency were physically aggressive, but also non prosocial, hyperactive, not anxious, and not inattentive.” Similarly, Raine and colleagues (1996) found that a subgroup of Danish males who had both biological and social deficits had particularly high rates of criminal and violent behavior. Kerr et al. (1997) found that disruptive-withdrawn boys who had depressive symptoms in the Montreal Longitudinal-Experimental Study were at the greatest risk for delinquency. In the cohort used in the present study, earlier analyses using self reports of delinquency as the outcome found that boys rated as shy in first grade by their teachers were less likely to be delinquent at ages 16–17 than those rated as neither shy nor aggressive, while boys who were rated as aggressive or as both shy and aggressive were more likely to be delinquent (Ensminger et al. 1983).

Taken together, these studies suggest that *patterns* or *combinations* of childhood risk factors as a whole need to be considered for understanding the development and continuation of antisocial behavior rather than examining each behavior as a separate entity or as a mere sum of risks. Therefore, this study adopts a person-oriented approach to investigate how different combinations of childhood problem behaviors affect later crime, independent of childhood family resources and family interactions.

Gender Differences

To extend the research further, this study examines the potential gender differences in both the clustering of the behavioral combinations and their effect on adult offending outcomes. In the past, much of our knowledge about patterns of crime has come from longitudinal studies of males only (e.g., Loeber and Dishion 1983; McCord 1983; Wolfgang et al. 1987; Farrington 1989; Magnusson and Bergman 1990; Sampson and Laub 1993). The research on gender and crime has grown dramatically over the past 15 years. However, the longitudinal research examining the relationship between early behavioral problems and later deviant behavior among African-American females is still somewhat scarce. While a number of studies have been successful in advancing our knowledge about the developmental patterns of female crime, these studies sample European or Canadian females who are predominantly white (see, White et al. 1990; Brook et al. 1992; Keenan et al. 1999; Cote et al. 2001; Moffitt et al. 2001; Broidy et al. 2003). Thus, many questions still remain as to the patterns of behavior in childhood and later crime for African–American females.

The existing research on gender differences and continuity of behavior over time is mixed. Several studies have found heterotypic continuity in both boys and girls such as childhood aggression predicts adolescent delinquency or adult criminality (see Lanctot and Le Blanc, 2002: 131, for a review). However, a few researchers do not find similarity among the sexes such as Stattin and Magnusson (1989) who found a strong connection between teachers' ratings of aggression at ages 10–13 and adult crime at age 26 for males but not for females. In addition, Broidy et al. (2003) examine the continuity of aggression and adolescent delinquency among six longitudinal samples and find that the continuity found in the boys over time does not consistently appear among girls. Also, in the earlier Woodlawn study, the continuity between first grade aggression and adolescent delinquency was present for males but not females (Ensminger et al. 1983). Thus, given the inconsistency in findings across several samples and the fact that the vast majority of studies have examined white females, it is still an open question whether long-term behavioral continuity is similar for males and females in an African-American population.

In general, the purpose of this paper is to understand how childhood behavioral patterns are associated with young adult serious crime in an epidemiologically-defined cohort of African Americans followed prospectively from first grade to age 32. We identify homogeneous clusters of children based on early behavioral ratings using cluster analysis to examine whether some combinations of childhood behaviors are more detrimental for adult criminal outcomes than others. In addition, this study examines whether family resources and relationships contribute to serious adult arrests independent of these combinations of

behavioral risks. Finally, this study examines the potential gender differences in these combinations of childhood behaviors and their relationship with serious adult crime.

Method

Description of the Woodlawn Study

This prospective, longitudinal study consists of a cohort of 1242 children who began first grade in the nine public and three parochial schools in Woodlawn in 1966–67 and remained in a Woodlawn school during their first grade year.[1] Woodlawn is a socially disadvantaged, inner-city community on the South side of Chicago with high rates of delinquency and crime. In the mid-1960s, when this study began, almost all Woodlawn residents were African American. This fact provides a unique opportunity to test continuity in behavior over several decades among African Americans who have been an understudied population in longitudinal research. The cohort comprises males and females (51.2 and 48.8%, respectively) from a variety of economic backgrounds (e.g., working-class, iddle-class, and welfare families).

A distinguishing feature of this longitudinal study is the high rate of criminal activity both within the cohort and within the community where the cohort lived when the study was initiated. During the period from 1966 to 1972, when this cohort was in adolescence, Woodlawn had the highest rate of male juvenile delinquents of the 76 community areas of Chicago [33.5 per 100 males between the ages of 12 and 16] (Council for Community Services 1975). The cohort members themselves display high rates of criminal activity with close to 50% of the males arrested for at least one serious crime between ages 17 and 32 (and 38% of the males arrested two or more times for serious crimes in adulthood). Moreover, this study is especially well-suited for examining gender differences since the females also display a high prevalence of crime. In the Woodlawn sample, 17% of the females had been arrested for at least one serious crime in adulthood and 7% of the females were arrested for two or more serious crimes.

During first grade, teachers were asked about each child’s classroom behavior; clinicians observed the children in standardized play situations; and mothers (or mother surrogates) were interviewed about their first grade child and the family. In 1975–1976, 10 years after the children had been in first grade (age 16–17), both mothers or mother surrogates and the adolescents were reinterviewed. At ages 32–34, the “children” were interviewed again. In addition, the Chicago Police and FBI records were searched for arrest information on the population. Criminal justice records for both the males and females included multiple names for many of the cohort members. In the follow-up of the “children,” family members and neighbors were queried as to where the cohort member might be located and if they (especially the women) had changed their names. In this paper, we rely on the information collected from mothers and teachers in first grade and the arrest records collected on cohort members from ages 17 to 32.

[1]The sample used in this study equals 1198 due to the exclusion of 44 cases who died prior to age 32.

Measures

Criminal Arrests—We obtained arrest records for the Woodlawn population from the Chicago Police Department in 1985, and then updated these in 1992. In 1993, the FBI matched their records with the names from the Woodlawn cohort. These arrest records gave a history of each person's contact with the criminal justice system and were cumulative, beginning when an individual was 17 (the age of majority in Illinois). The type of offense, the disposition, and the dates of arrest were coded for each crime.[2] For the purposes of this study, we divided the sample into four mutually exclusive groups: those with at least one serious violent crime, those with at least one serious property crime but no serious violent crime, those with only a non-serious crime, and those with no criminal arrests.[3] We use this categorization as opposed to a continuous crime count to safeguard against underestimating the actual arrest rate for each individual. We do not have complete incarceration information for the time period of ages 17–32. Therefore, a true lambda measure of offending cannot be calculated for a Poisson regression. Since the arrest counts in a Poisson regression would be an underestimate of the predicted offending rate, we used a nominal measure of serious offending which is less sensitive to incarceration stays.

As shown in Table 1, 38% of the cohort had an official arrest record between the ages of 17 and 32 (56% of the males and 21% of the females). This is relatively high compared to other longitudinal samples due to the high-risk nature of this cohort. Piquero et al. (2003, p. 429) review the overall, gender-specific, and race-specific prevalence rates in several of the leading longitudinal studies that report official criminal career histories. They report a range of overall prevalence rates between 7 and 40% with higher percentages among males and African-Americans.

Among this cohort, males were more likely to be arrested for serious crimes than females and more likely to have an arrest for a serious violent crime as opposed to only a serious property crime. The majority of the males who were arrested for at least one serious violent crime were most likely to be arrested for crimes of injury against a person followed by robbery (87 and 30%, respectively). Similarly, the females with at least one serious violent arrest were most likely to commit these two crime types (89% arrested for injury against a person and 13% arrested for robbery).

Early Behavioral Responses in School for Clustering—Using cluster analysis, we examine six teacher ratings of first grade classroom behaviors that measure conceptually distinctive indicators of childhood behavior. In first grade, teachers in an interview rated each child in their classroom on five aspects of school adaptation, including aggressive behavior, shy behavior, problems with concentration (restlessness), underachievement, and immaturity. These behaviors had earlier been identified by teachers as important indicators of adaptation to school (Kellam et al. 1975). In addition, the teacher graded each child's

[2]These records were independently coded by Joan McCord, a criminologist, and Loretta Hall Morgan, a criminal court judge in Chicago.

[3]Serious violent crimes include murder, manslaughter, rape, assault, battery, domestic assault, weapons charges, and kidnapping. Serious property crimes include arson, auto theft, possession of a stolen automobile, breaking and entering, burglary, theft, and attempted theft. Non-serious crimes include crimes of prostitution, traffic violations, crimes against order, business crimes, and alcohol or drug-related crimes.

general classroom conduct as unsatisfactory, fair, good, or excellent. All six of the classroom behavior measures were coded on a scale that ranged from 0 to 3 (see Appendix for a correlation matrix of these six variables).

Family Characteristics—The indicators of family resources and family interaction patterns were collected from the mothers or mother surrogates in a home interview at the time of first grade in 1967. The family interview included questions about the family itself such as income, family structure, occupation, residential mobility, social integration, and education; questions about the children such as mothers' ratings of mental and physical health; and questions concerning the family's child rearing practices, especially with regard to discipline and affection.

Mother's education, welfare receipt, family size, and family type were included as measures of *family resources* in 1967. Mother's education is a continuous measure of years completed in school and ranged from 0 to 18 years. Welfare receipt referred to whether the family was supported by welfare and was dichotomized as yes or no. Since mother's education (0–11 years versus 12+ years) and receiving welfare were highly associated (χ^2=64.40, $P < 0.001$), only mother's education was included in the multivariate analyses. Family size is a continuous measure that indicates the number of children under 19-years-old at home and ranges from 1 to 15. Family type was based on the combinations of adults in the family of the first graders and included four types: mother and father present, mother alone, mother and other adults (not the father), and families with no mother present (mother absent).

In 1967, mothers were asked a series of questions about their and other adult family members' interactions with their children (*family interactions*). In terms of family affection, mothers were asked: (1) how often did they play with or read to the child (1 = less often to 3 = everyday) and (2) how often did the child get taken out (0 = never to 4 = every week). In terms of discipline, mothers were asked: (1) how often the child was spanked (0 = never spanked to 5 = almost every day); and (2) how often the child got punished for misbehavior (1 = hardly ever to 4 = always). Factor analysis of these four items showed a two factor solution with 62.6% explained variance. First, the measures of family discipline includes spanking and getting punished ($r = 0.27$, $P < 0.001$). The composite score of family discipline was constructed with a range of 1–9. Next, the measures of family affection include the number of times the child was played with or read to and the frequency that the child was taken out ($r = 0.19$, $P < 0.001$). The composite score of family affection was constructed with a range of 1–7.

Analysis

There are three stages of analyses. Initially, cluster analysis was used to identify coherent subgroups based upon the six ratings of early behavioral responses in school as described above. Children who are similar on a variety of behaviors are grouped together to form clusters of children with similar behavior patterns. This approach simultaneously combines several behaviors to uncover meaningful, integrative behavioral patterns. In the second phase, we examined the relationships of cluster memberships to first grade family resources and family interaction patterns. ANOVA and contingency tables were used to examine the

overall relationship between cluster membership and early family resources and family interactions. We also examined how the clusters related to later serious crime. Finally, we estimated multivariate multinomial regressions to identify whether childhood behavior patterns and family characteristics related to later arrests for serious violent and property crimes during adulthood. We also checked whether multinomial estimates might violate the independence of irrelevant alternatives (IIA) assumption (see Long 1997: 182–184). Generalized Hausman tests (with suest command) were performed using STATA 8.0. Under the IIA assumption, multinomial logit models assume that the odds for specific pairs of outcomes should not depend on other outcomes available. All of the analyses were based on (N = 1198); 44 cases who had died by age 32 were excluded.

Results

Description of Clusters

Cluster analysis was employed to assess whether coherent subgroups could be identified based upon the six ratings of early behavioral responses in school described above. Past research has shown gender differences in the prevalence of early behavioral ratings and in the prevalence of criminal arrests. Therefore, males and females were clustered and analyzed separately. Since cluster analysis is sensitive to outliers, we used the average squared Euclidean distance between observations to locate observations that fell outside a threshold distance of 0.5 from at least one other observation (Bergman 1998). Seven boys and 15 girls did not fit any cluster and were left unclassified and placed in the residual group.

Ward's method (1963), a hierarchical agglomerative clustering technique, assigned cases to initial clusters in the Sleipner Statistical package for pattern-oriented analysis (Bergman and El-Khouri 1998). This method begins with observations as separate clusters and then gradually links them together based on their squared Euclidean distance from one another. This method is designed to optimize the variance between clusters (Aldenderfer and Blashfield 1984). Based on the variance explained by solutions containing varying numbers of clusters, we decided on a seven-cluster solution, which explained about 50% of the total variance. While a higher cluster solution explains more variance, there are diminishing returns with increasing cluster solutions. Based on a sudden drop in the explained error sum of squares at the seven cluster solution, we chose a seven cluster solution (Bergman 1998).

In the final step of the clustering process cases were reassigned by moving ill-fitting observations into better-fitting clusters so that homogeneous clusters were obtained (Bergman and El-Khouri 1998). This is an iterative procedure; observations are reassigned iteratively until all observations are assigned to the best-fitting cluster. This procedure increased the explained error sum of squares to about 53% for both males and females. The seven-cluster solutions are shown in Table 2 for males and Table 3 for females.

Pattern Analysis of Behavioral Problems Among First Grade Boys—For males, Cluster 1 (12.7%, n = 72) was characterized by the absence of problems; the means of all six indicators were less than 1 on a scale ranging from 0 to 3 with 0 indicating adapting or no problem (see Table 2). This cluster was labeled "no problems." The second male cluster (40.6%, n = 230) was characterized by moderate conduct scores, with no other adaptation

problems. This cluster was labeled “mild conduct problems.” Those in Cluster 3 (7.6%, n = 43) had high ratings on shy behavior as well as moderate ratings on underachievement and immaturity; this cluster was labeled “high shy behavior.” Cluster 4 (13.4%, n = 76) was characterized primarily by moderate problems in restlessness, underachievement, and immaturity, but not shy or aggressive behavior, and was labeled “moderate problems but not shy or aggressive.” Cluster 5 (10.9%, n = 62) included boys with moderately high conduct grades and aggressive ratings and was labeled “moderate aggressiveness.” Two multiple problem male clusters were identified (6, 7). Cluster 6 (7.9%, n = 45) was characterized by severe maladaptation on all behaviors except shy behavior and was labeled “multiple problems but not shy.” Cluster 7 (6.9%, n = 39) was characterized by severe maladaptation on all the behavioral problems. This subgroup was labeled “multiple problems.” The residual group, although moderate to high on all of the behavioral indicators, did not fit into any specific cluster. These seven males are excluded from the multivariate analyses.

Pattern Analysis of Behavioral Problems Among First Grade Girls—Table 3 displays the cluster solution for females. The first five clusters show similar patternings of behavior (but not similar prevalences) to those identified among the male sample. For instance, Cluster 1 (25.8%, n = 157) was labeled “no problems” and included girls with low scores on each of the behavioral dimensions. The girls in Cluster 2 (30.9%, n = 188) had moderate conduct scores yet no other behavioral problems and this cluster was labeled “mild conduct problems.” Cluster 3 (5.6%, n = 34) was characterized as a “high shy behavior” group which included those girls with high scores on shyness, underachievement, and immaturity. Cluster 4 (5.9%, n = 36) was characterized as having moderate problems in restlessness, underachievement, and immaturity but not shy or aggressive behavior. This cluster was labeled as “moderate problems but not shy or aggressive.” Again, similar to the males, Cluster 5 (12.3%, n = 75) was characterized by moderate aggressiveness and moderate conduct problems only and was labeled a “moderate aggressive” group. Unlike the male sample, no multiple problem but not shy group was identified in the female sample. The sixth cluster for the females (14.0%, n = 85) included girls with moderate levels of underachievement and was referred to as the “mild underachievement” group. Finally, as seen with the male subsample, Cluster 7 (5.6%, n = 34) was characterized by high maladaptation in first grade for all the behavioral responses. This group was labeled the “multiple problems” group. Fifteen girls did not fit any cluster and were left unclassified and placed in the residual group. These 15 females show moderate levels of each behavior but do not fit into any specific cluster and are excluded from the multivariate analyses.

Cluster Membership and Early Family Characteristics

Tables 4 and 5 show the relationship of family resources and family interactions to cluster membership for males and females, respectively. As Table 4 indicates, the male no problem group (Cluster 1) had the most family resources, the most affection, and the lowest level of discipline/punishment. These families had the lowest percentage of welfare receipt, the highest level of maternal education, the lowest number of children in the family, the lowest percentage of mother alone families, the lowest level of discipline, and the highest level of affection. Males in the high shy behavior cluster (Cluster 3) had the lowest overall family resources during first grade as indicated by a high percentage of welfare receipt (55.8%), the

lowest level of maternal education, and the highest number of children at home. They also had the lowest levels of affection (4.05 ± 1.55). With respect to discipline, the moderate aggressive group (Cluster 5) had the highest discipline scores, indicating the harshest and most frequent discipline practices (6.11 ± 1.74).

There are some similarities and some differences for the females (see Table 5). Similar to the males, the no problem group (Cluster 1) had the most family resources with the lowest percentage of families on welfare and the highest levels of maternal education (22.9% on welfare and 11.2 ± 2.14 for maternal education). One difference from the male findings is that the multiple problems group (Cluster 7), not the high shy group, scored lowest on family resources in terms of receiving welfare in first grade (52.9%) and having mothers with low educational attainment (10.1 ± 2.16). In addition, for females, while the no problem group had the lowest discipline scores, again the multiple problem group had the highest scores on the discipline scale (4.71 ± 1.93 and 6.06 ± 1.85, respectively).

Cluster Differences on Criminal Outcome

Next we turn to how criminal arrests for serious violent and property crimes varied by cluster membership. Figure 1 shows that cluster membership is associated with criminal arrests for both males and females ($P < 0.05$). For males, three of the seven clusters have rates of serious crimes that exceed 50%. For both males and females, the multiple problems group had the highest percentage of criminal participation; about 72% of males in the multiple problem cluster had an arrest for a serious crime compared to almost 31% in the no problem cluster, while about 29% of females in the multiple problem cluster had an arrest for a serious crime compared to about 12% in the no problem cluster and 9% in the high shyness cluster.

Factors Associated with Criminal Outcome

To investigate any differences due to crime type, multinomial (polychotomous) logistic regressions were used to examine the characteristics associated with both three categories and four categories of criminal outcomes. The three categories included: (0 = no crime, 1 = non-serious crime, 2 = serious property or serious violent crime). The four categories were: (0 = no crime, 1 = non-serious crime, 2 = serious property crime only, 3 = serious violent crime).[4] In these analyses, family resources and family interactions were included as control variables to examine whether cluster membership affects serious criminal arrests, independent of these family influences. Since those with non-serious crime did not differ on any of the characteristics that we examined, their findings are not presented.[5]

Any Serious Crime—Table 6 shows the results from the multiple regression analysis of cluster membership and serious crime. For males (right-hand column), the multiple problems cluster (Cluster 7) (OR = 4.84, 95% CI 1.93, 12.14), the multiple problems but not

[4]Each of the multinomial logistic regressions were analyzed with and without the 44 dead cases revealing virtually identical results. The analyses excluding the deceased cases are presented.

[5]Using the arrest counts (not accounting for incarceration time), negative binomial regression analyses indicate similar results for males and females with respect to significance and direction (data not shown). While there were a few differences in the results, the primary conclusions from the negative binomial analyses concur with the multinomial logit analyses reported here.

shy cluster (Cluster 6) (OR = 3.75, 95% CI 1.53, 9.19), the moderately aggressive group (Cluster 5) (OR = 2.84, 95% CI 1.29, 6.25), and the mild conduct problem group (Cluster 2) (OR = 2.18, 95% CI 1.17, 4.06) each have a significantly higher odds than the no problem cluster of being arrested for a serious crime. Those males in a mother alone family in first grade were about one and a half times more likely to be arrested for a serious crime by age 32 while the family interaction indicators were not associated with being arrested for a serious crime in adulthood for males.

For females (left-hand column), the multiple problems cluster (Cluster 7) (OR = 2.77, 95% CI 1.07, 7.19) and the moderate aggressiveness cluster (Cluster 5) (OR = 2.24, 95% CI 1.04, 4.80) each have a significantly higher odds than the no problem cluster of being arrested for a serious crime in adulthood. In addition, discipline in childhood was associated with later serious crime for the females; those who had frequent punishment and spanking had a higher odds of criminal arrests than those with less punishment and spanking (OR = 1.15, 95% CI 1.01, 1.31). None of the family resource variables in first grade were related to serious crimes for the females.

Serious Property and Violent Crime—Interestingly, from the crime-specific analysis displayed in Table 7 it becomes clear that the results on serious crime from Table 6 are driven by violent arrests. For both the males and females, cluster membership with one exception is unrelated to serious property offending when compared to no criminal arrests. The one exception is that the multiple problems but not shy cluster for males (Cluster 6) has a higher risk of a serious property arrest than the no problem category (OR = 4.54, 95% CI 1.17, 17.66). For females, those from larger families have a higher risk of a serious property arrest (OR = 1.18, 95% CI 1.03, 1.34). When the focus is on serious violent crimes, the same substantive conclusions emerge for both the males and the females that were reported in Table 6. The same four male clusters (2, 5, 6, and 7) and two female clusters (5 and 7) have a significantly higher odds than the no problem cluster of being arrested for a serious violent crime. Moreover, the odds ratios in the crime-specific analysis are larger than those found with the combined serious property and violent crimes category. Finally, family type was associated with serious violent crime for males; those males from mother only families were more likely to be arrested for a serious violent crime compared to those from mother–father families (OR = 1.79, 95% CI, 1.15, 2.81). For females, family discipline practice is marginally associated with serious violent crimes (OR = 1.19, $P = 0.058$).

Discussion and Conclusions

This research study attempted to address several issues regarding the continuity of childhood problem behaviors and adult offending. First, we asked whether different combinations of childhood behaviors influence serious adult offending. The answer is not a straightforward one. We employed a person-oriented approach to analyze this continuity in behavior. In reality, specific behaviors rarely function as independent entities, thus, a person-oriented analyses rather than variable-oriented analyses seems most appropriate (Meyer and Megargee 1977; Magnusson 1988, 1996; Stattin and Magnusson 1989, 1996; Pulkkinen and Tremblay 1992; Sorenson and Johnson 1996; Raine et al. 1996; Kerr et al. 1997; Flanagan et al. 2003).

In this analysis, a person-oriented approach proved to be beneficial in that, as opposed to arbitrarily assuming that behaviors operate independently as one might in a variable-oriented analysis, the clustering technique uncovered the combinations of behaviors that naturally occur within individuals. These analyses identified seven distinct and meaningful clusters of childhood behavior for both males and females. Moreover, these clusters were more similar to each other than distinct across gender. There were two minor differences between the male and female cluster analysis results. First, there was a distinct cluster (Cluster 6) for the males and females. The male Cluster 6 was a multiple problems group that had high scores in every behavior except shyness. The female Cluster 6 had moderate levels of underachievement but low levels of the other behaviors. The second difference was that, among the six similar clusters, the males always had higher means on the problems than the females and the prevalence in each group varied somewhat across gender.

While this consistency between males and females in the clusters indicates that the clusters are meaningful, the drawback is that not all possible combinations of behaviors emerged naturally, making it difficult to come to a straightforward conclusion regarding whether different behavior patterns affect serious adult offending. For instance, underachievement and restlessness did not occur at high levels in isolation. In fact, they did not occur without high levels of aggression and/or high levels of immaturity. Since these patterns did not occur, it is not relevant to speculate about their influence on serious adult offending.

The key finding with respect to the combinations identified for both genders is that the presence of aggression, even at moderate levels, is a key predictor of adult offending regardless of its combination with other behaviors. Thus, whether a person has moderate aggression and poor general conduct scores (the moderate aggressive group) or has these two behaviors in combination with immaturity, restlessness, and underachievement, the common predictive factor of adult serious offending for both males and females was the presence of aggression. This is consistent with research that finds aggression to be a key predictor of crime into adulthood (see Huesmann et al. 2002). Those with poor general conduct scores without high levels of aggression (mild conduct problems group) also were predictive of adult offending, although this was true only for males. Low conduct scores are generally given to those with misbehavior that is similar to aggressive behavior—not following teacher’s instructions, disruptive behavior, or difficulty with other children. This finding indicates that even a minimal indication of conduct problems is predictive of later serious offending among this population. Finally, these clusters predict serious violent adult offending when compared with non-offenders or non-serious offenders. In both the males and females, the same clusters that were found to predict serious offending overall predicted serious violent offending but did not consistently predict serious property offending.

One unexpected finding was the lack of a protective finding for shyness. In prior research on the Woodlawn cohort, shy behavior has been a protective behavior with those who are rated as shy but not aggressive as indicated by lower rates of both drug use and delinquency (Kellam et al. 1983; Ensminger et al. 1983). However, in this person-oriented approach, the high shyness group for both genders was not protective of serious adult offending. In fact, for males, the high shyness group had close to 50% of its members with a serious criminal arrest. This discrepancy could be due to the fact that these individuals were not merely high

in shyness but also high in their immaturity scores and in underachievement, and that they came from the most disadvantaged families. High levels of shyness do not appear to occur in isolation and thus, once a holistic approach is taken, the finding of shyness as a protective factor is no longer present. Another explanation for the inconsistency in these results is that the outcome of interest is serious adult offending as opposed to childhood or adolescent problem behaviors. Perhaps once the time frame is extended through young adulthood, childhood shyness no longer plays a role in predicting behavior. Or perhaps, shyness is protective of drug involvement or delinquency as opposed to serious violent and property offending.

With respect to the second question posed in this study, childhood family resources and interactions related differently to the outcomes for the males and the females. In the multivariate analyses, females who had more family discipline practices were less likely to be arrested for serious crimes. Whether this is a selection factor or a social causation factor is not possible to determine from these data, but it does indicate that early discipline practices may be an important indicator for girls. Family discipline was not related for males and family affection was not related to offending for either males or females.

Males from mother alone families in first grade were more likely to have a criminal arrest by age 32. Several studies have shown the long-term impact of family structure on adult outcomes (Amato 1991; Nurco et al. 1996; Cherlin et al. 1998). Barrett and Turner (2005) show that single parent households differ in their socioeconomic status, family processes and stressful life events, and that all three of these contribute to the detrimental impact of having grown up in a single parent household. In our study, socioeconomic differences, family processes, and early childhood behavior patterns were controlled in the analyses and still there was an effect of being from a mother alone family. Early family structure may be a marker for a variety of family issues—socioeconomic status, family processes, family stress. While we have controlled for these somewhat in our analyses, family structure is still important.

Family factors are also related to the cluster assignments. Females in the multiple problems cluster came from families with fewer resources than those from the other groups. For males, those in the high shy group came from families with low resources and poor family interactions. Perhaps for these males, growing up in a family with fewer resources, harsh and frequent discipline, and lower affection inhibited their social relationships in early childhood, while for females it resulted in a variety of maladaptive behaviors. Regardless of the mechanism, the direct and indirect effect of childhood family factors on adult offending is clear and is consistent with previous research (see Sampson and Laub 1993; Huesmann et al. 2002).

Finally, the overall conclusion is that there are no major differences between males and females in either the combinations of risks or the continuity of behavior over time among this sample of African–Americans. That is, similar clusters emerged for both males and females and the developmental continuity between childhood clusters of behavior and serious adult crime was also apparent for both genders. This finding, while it concurs with some of the existing research is counter to those reported by others such as Broidy and her

colleagues (2003). Thus, it is important to try and reconcile our findings with those of Broidy et al.'s especially since they sampled six longitudinal samples from three countries and found no such clear relationship between aggression and offending among the female samples. There are two primary differences that may explain the discrepancy. The first is that Broidy et al. use a variable-centered approach that includes aggression with three other early behavioral problems into a multivariate model. While the evidence indicates that there are significant bivariate associations between early behaviors and later delinquency among boys and girls, these relationships are not sustained in the multivariate framework. In contrast, since we know risks tend to cluster in the same individuals, our approach is a person-centered approach which allows aggression to co-occur with other behavioral problems and reveals that those with multiple problems as well as any evidence of high levels of aggression or mild conduct problems predict later violence. The second difference is that we are examining a sample of African–American females while only one of the six sites in their study includes African–Americans with the majority of that sample being Caucasian (80%). Thus, the differences in findings could be due to the differences between using a person-centered approach versus a variable-oriented approach or to the nature of the samples used.

Overall, the evidence from this study indicates that no additional complexity in pathways to serious adult crime is necessary to accommodate female behavior patterns. Although family discipline emerged as a significant family predictor for females and family structure emerged as a family predictor for men in the multivariate analysis, the bivariate relationships between the clusters for both genders showed that those with more resources and affection had fewer behavioral problems. Taken together, a gender-neutral approach to continuity in behavior over time seems most appropriate, at least among high-risk African–American men and women. These results concur with the findings of similarity between genders among all-white populations as well (see Moffitt et al. 2001).

This gender-neutral approach extends to prevention policy as well. The results from the current study indicate that programs that are aimed at early aggressive behavior are focused on an attribute shown to be an important predictor of serious offending in early adulthood among both sexes (e.g., Kellam et al. 1994; Bierman et al. 2002). In addition, the potential importance of the family context is shown in these results, thus, multi-level prevention approaches which target aggression as well as family practices may be most beneficial.

Finally, the Woodlawn study has some unique study design features that can contribute to the existing knowledge from previous studies that have shown continuity in behavior among whites, males, adolescents, and/or populations with low rates of crime. First, there are few cohort studies that have followed an African–American community population from childhood to adulthood using a prospective, longitudinal design. Second, while many longitudinal studies of crime have included males only, this study includes both males and females. Third, the study population has relatively high rates of criminal arrests for serious crimes. Thus, in corroboration of and in addition to prior research, our results show developmental continuity of antisocial behavior across the life course among this unique study population of African–American males and females with high rates of offending who have been studied from first grade to age 32.

One limitation of the present study is its reliance on official records for the measure of crime. Official police records reflect police behavior as well as criminal behavior. It also has been argued that more extreme differences in race, class, and sex are found with official records as compared to self-reports (Elliott and Ageton 1980). However, self-reports may also be biased by underreporting, over reporting, and problems of recall bias. In the Woodlawn study, we compared respondents self-reports of criminal activity with their criminal justice records from the Chicago police and from the FBI (McCord and Ensminger 1995). There was a high correlation of official records and self reports. About 77% of respondents who had official arrest records self-reported committing crimes. Future research could investigate the issue of behavioral continuity using minor offenses and self-reported offending.

While one strength of the study is the nature of its population, it is also a limitation in that it is not clear to whom the results can be generalized. The cohort includes a very specific community population born in the 1960s. Whether the findings pertain to those who differ in year of birth or community of residence is not known and can only be evaluated in comparisons with other study populations. We are fortunate with the criminology literature in that there are more than a few longitudinal studies to which we can compare our findings. The general conclusion of behavioral continuity revealed among this cohort of African–American children from one neighborhood in Chicago is consistent with other studies from different time periods, in varying environments, and with a variety of populations.

The results from this study also point to several other important areas to be considered in future research. In this study we were able to investigate only a subset of possible childhood behaviors. Future research could evaluate whether combinations of other childhood behaviors affect adult offending. In addition, future research could investigate how adolescent variables such as peers and school factors mediate this relationship between child behavior patterns and adult offending. This research also does not include adult social variables such as marriage and employment or marital discord and job instability which have also been found to affect adult offending and may mediate the relationship between behavior clusters and adult offending (see Sampson and Laub 1993). Finally, future research should employ a person-centered approach to evaluate the continuity between childhood behaviors and adult behaviors.

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Appendix

The correlation matrix for variables in the cluster analysis for males (below the diagonal) and females (above the diagonal)

	1	2	3	4	5	6
1. Aggressiveness	–	0.67*	0.50*	0.43*	0.24*	0.51*
2. Restlessness	0.71*	–	0.58*	0.60*	0.26*	0.54*
3. Underachievement	0.53*	0.60*	–	0.62*	0.43*	0.38*
4. Immaturity	0.55*	0.66*	0.60*	–	0.51*	0.34*
5. Shyness	0.34*	0.35*	0.43*	0.51*		0.13*
6. Conduct scores	0.51*	0.50*	0.29*	0.32*	0.07	–

*$P < 0.01$

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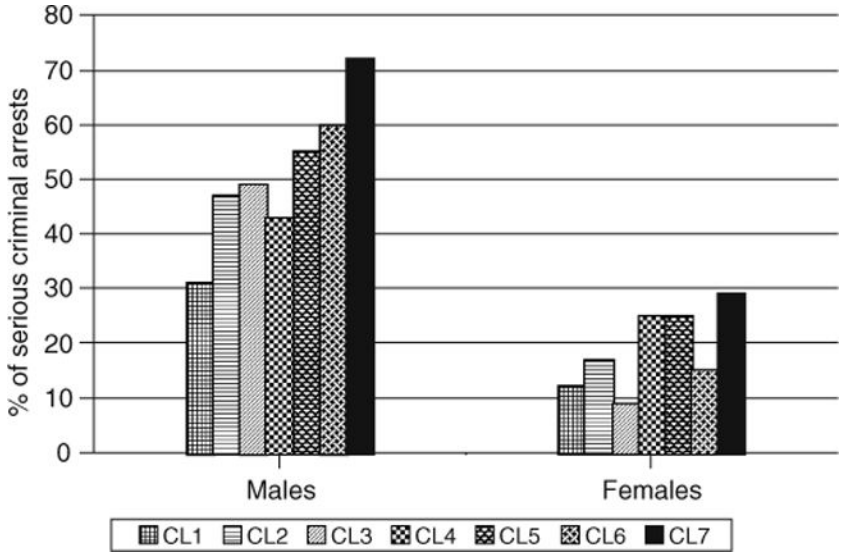

Fig. 1.
Serious criminal arrests and cluster membership by sex

Table 1

Descriptive statistics of criminal categorization

	Males (*N* = 574)		Females (*N* = 624)		Total (*N* = 1198)[a]	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Any serious violent arrest	226	39.4	53	8.5	279	23.3
Any serious property arrest (with no serious violent arrest)	50	8.7	55	8.8	105	8.8
Only nonserious arrests	46	8.0	25	4.0	71	5.9
No arrest	252	43.9	491	78.7	743	62.0

[a]The total number of cases is 1198 due to the 44 cases who had died by age 32

Table 2

Patterns of early behavioral problems at age 6–7 (Boys, $n = 574$)

Cluster means							
Cluster no	**Size (%)**	**Aggressiveness**	**Restlessness**	**Underachievement**	**Immaturity**	**Shyness**	**Conduct scores**
1	72 (12.7)	0.03	0.06	0.26	0.17	0.24	0.00
2	230 (40.6)	0.07	0.12	0.25	0.07	0.17	1.35
3	43 (7.6)	0.37	0.14	1.35	1.42	2.19	0.74
4	76 (13.4)	0.68	1.37	1.21	1.50	0.53	1.80
5	62 (10.9)	1.48	0.68	0.53	0.27	0.26	2.08
6	45 (7.9)	2.51	2.58	2.18	1.98	0.22	2.33
7	39 (6.9)	2.41	2.64	2.33	2.56	2.67	2.21
Residual	7	1.50	2.50	1.67	1.67	2.00	1.17

Note. All scores are 0–3

1. No problems

2. Mild conduct problems

3. High shyness

4. Moderate problems but not shy or aggressive

5. Moderate aggressiveness

6. Multiple problems but not shy

7. Multiple problems

Table 3

Patterns of early behavioral problems at age 6–7 (Girls, $n = 624$)

Cluster means							
Cluster no	**Size (%)**	**Aggressiveness**	**Restlessness**	**Underachievement**	**Immaturity**	**Shyness**	**Conduct scores**
1	157 (25.8)	0.01	0.01	0.06	0.08	0.13	0.00
2	188 (30.9)	0.00	0.06	0.02	0.06	0.081	0.21
3	34 (5.6)	0.14	0.19	1.39	1.83	2.25	0.61
4	36 (5.9)	0.71	2.08	1.53	1.95	0.58	1.95
5	75 (12.3)	1.22	0.62	0.53	0.41	0.24	1.47
6	85 (14.0)	0.06	0.23	1.16	0.76	0.36	0.97
7	34 (5.6)	2.57	2.74	2.46	2.37	1.20	2.17
Residual	15	1.81	1.31	1.88	1.19	1.31	1.63

Note. All scores are 0–3

[1] No problems

[2] Mild conduct problems

[3] High shyness

[4] Moderate problems but not shy or aggressive

[5] Moderate aggressiveness

[6] Mild underachievement

[7] Multiple problems

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Table 4

Family resources and family interaction by the cluster groups (Males = 567)

	Cluster 1 (*n* = 72)	Cluster 2 (*n* = 230)	Cluster 3 (*n* = 43)	Cluster 4 (*n* = 76)	Cluster 5 (*n* = 62)	Cluster 6 (*n* = 45)	Cluster 7 (*n* = 39)	*P*-value (χ^2, *F* statistics)
Family resources								
-Welfare receipt in 1966 (%yes)	16.7%	31.3%	55.8%	40.8%	35.5%	46.7%	25.6%	$P < .01$
Mother's education (mean ± SD, range 0–18)	11.4 ± 2.18	10.7 ± 2.24	9.2 ± 3.04	10.5 ± 2.03	10.6 ± 1.78	10.5 ± 2.20	9.9 ± 2.56	$P < 0.01$
Number of children < 19 in home (mean ± SD, range 1–15)	3.46 ± 1.65	4.40 ± 2.42	5.16 ± 2.72	4.55 ± 2.11	4.50 ± 2.30	3.84 ± 2.29	4.05 ± 2.20	$P < 0.01$
Family type (% of mother alone family)	27.8%	31.3%	48.8%	42.1%	45.2%	57.8%	28.2%	$P < 0.01$
Family interaction								
Discipline (mean ± SD, range 1–9)	5.04 ± 1.66	5.41 ± 1.91	5.83 ± 1.84	5.91 ± 1.73	6.11 ± 1.74	5.76 ± 1.76	5.59 ± 1.86	$P < 0.01$
Affection (mean ±SD, range 1–7)	5.00 ± 1.39	4.70 ± 1.41	4.05 ± 1.55	4.47 ± 1.60	4.85 ± 1.47	4.91 ± 1.47	4.53 ± 1.45	$P < 0.05$

1. No problems

2. Mild conduct problems

3. High shyness

4. Moderate problems but not shy or aggressive

5. Moderate aggressiveness

6. Multiple problems but not shy

7. Multiple problems

Table 5

Family resources and family interaction by the cluster groups: (Females = 609)

	Cluster 1 (*n* = 157)	Cluster 2 (*n* = 188)	Cluster 3 (*n* = 34)	Cluster 4 (*n* = 36)	Cluster 5 (*n* = 75)	Cluster 6 (*n* = 85)	Cluster 7 (*n* = 34)	*P*-value (χ^2, *F* statistics)
Family resources								
Welfare receipt in 1966 (%yes)	22.9%	27.7%	26.5%	36.1%	34.7%	36.5%	52.9%	$P < 0.01$
Mother's education (mean ± SD, range 0–18)	11.2 ± 2.14	10.6 ± 2.56	10.7 ± 1.70	10.6 ± 1.84	10.9 ± 1.89	10.2 ± 2.06	10.1 ± 2.16	$P < 0.05$
Number of children <19 in home (mean ± SD, range 1–15)	4.0 ± 1.99	4.18 ± 2.10	4.62 ± 2.45	4.39 ± 2.41	4.47 ± 2.22	4.66 ± 2.20	4.38 ± 2.63	$P = 0.31$
Family type (% of mother alone family)	29.9%	30.3%	35.3%	41.7%	49.3%	41.2%	50.0%	$P = 0.20$
Family interaction								
Discipline (mean ± SD, range 1–9)	4.71 ± 1.93	5.09 ± 1.77	5.18 ± 1.86	5.42 ± 1.78	5.52 ± 1.90	5.36 ± 1.84	6.06 ± 1.85	$P < 0.01$
Affection (mean ± SD, range 1–7)	4.93 ± 1.40	4.80 ± 1.48	4.41 ± 1.13	4.89 ± 1.33	5.13 ± 1.43	4.68 ± 1.54	4.88 ± 1.60	$P = 0.27$

1. No problems

2. Mild conduct problems

3. High shyness

4. Moderate problems but not shy or aggressive

5. Moderate aggressiveness

6. Mild underachievement

7. Multiple problems

Table 6

Multiple multinomial regression of childhood behaviors, family resources and interaction, on serious criminal arrests: odds ratio and 95% confidence interval

	Females (*n* = 572) OR (95% CI)	**Males (*n* = 533) OR (95% CI)**
Childhood behavior cluster		
(0=no problem)		
2. Mild conduct problems	1.38 (0.71, 2.65)	2.18 (1.17, 4.06)*
3. High shyness	0.66 (0.18, 2.46)	1.78 (0.73, 4.30)
4. Moderate problems but not shy or aggressive	1.84 (0.70, 4.86)	1.86 (0.87, 3.95)
5. Moderate aggressiveness	2.24 (1.04, 4.80)*	2.84 (1.29, 6.25)*
6. Mild underachievement (female)	1.15 (0.52, 2.57)	3.75 (1.53, 9.19)*
Multiple problems but not shy (male)		
7. Multiple problems	2.77 (1.07, 7.19)*	4.84 (1.93, 12.14)*
Family resources		
Mother's education (0–18)	1.03 (0.92, 1.15)	0.95 (0.87, 1.03)
Number of children < 19 at home (1–15)	1.10 (0.99, 1.23)	1.06 (0.97, 1.15)
Family type (0 = mother/father family)		
Mother alone	1.50 (0.90, 2.51)	1.62 (1.06, 2.49)*
Mother other	1.49 (0.74, 2.96)	0.94 (0.54, 1.63)
Mother absent	2.50 (0.95, 6.58)	1.57 (0.62, 3.99)
Family interaction		
Discipline: punishment & spanking (2–13)	1.15 (1.01, 1.31)*	1.07 (0.97, 1.19)
Affection: taken out to movies and played or read (1–7)	1.03 (0.88, 1.22)	1.04 (0.91, 1.19)

*$P < 0.05$; The reference category is no crime; The findings of nonserious crime were not reported; The independence of irrelevant alternatives (IIA) assumption of multinomial logit was not violated (χ^2=8.81 (13 df), P = 0.787 for males; χ^2=3.37 (13 df), P = 0.996 for females)

Table 7

Multiple multinomial regression of childhood behaviors, family resources and interaction, on serious criminal arrests: odds ratio and 95% confidence interval

	Females (*n* = 572) OR (95 CD)		Males (*n* = 533) OR (95% CD)	
	Serious property crime	**Serious violent crime**	**Serious property crime**	**Serious violent crime**
Childhood behavior cluster				
(0=no problem)				
2. Mild conduct problems	1.51 (0.64, 3.55)	1.22 (0.48, 3.10)	1.46 (0.50, 4.26)	2.45 (1.24, 4.88) *
3. High shyness	0.80 (0.16, 4.01)	0.48 (0.06, 4.05)	1.22 (0.25, 5.98)	1.98 (0.76, 5.13)
4. Moderate problems but not shy or aggressive	1.30 (0.32, 5.30)	2.42 (0.71, 8.26)	1.39 (0.38, 5.12)	2.03 (0.89, 4.62)
5. Moderate aggressiveness	1.40 (0.46, 4.27)	3.14 (1.18, 8.34) *	1.07 (0.23, 5.02)	3.46 (1.48, 8.05) *
6. Mild underachievement (female)	1.47 (0.54, 3.97)	0.77 (0.22, 2.71)	4.54 (1.17, 17.66) *	3.57 (1.35, 9.41) *
Multiple problems but not shy (male)				
7. Multiple problems	1.58 (0.38, 6.62)	4.01 (1.25, 12.87) *	3.33 (0.79, 14.06)	5.34 (1.99, 14.33) *
Family resources				
Mother's education (0–18)	1.03 (0.89, 1.19)	1.02 (0.88, 1.19)	0.99 (0.86, 1.16)	0.94 (0.86, 1.03)
Number of children < 19 at home (1–15)	1.18 (1.03, 1.34) *	1.03 (0.89, 1.19)	0.98 (0.84, 1.14)	1.07 (0.98, 1.17)
Family type (0 = mother/father family)				
Mother alone	1.40 (0.71, 2.78)	1.62 (0.80, 3.27)	1.02 (0.48, 2.20)	1.79 (1.14, 2.81) *
Mother other	1.30 (0.51, 3.32)	1.69 (0.67, 4.25)	1.20 (0.50, 2.90)	0.86 (0.47, 1.57)
Mother absent	2.89 (0.86, 9.69)	2.10 (0.53, 8.30)	0.53 (0.06, 4.65)	1.87 (0.72, 4.86)
Family interaction				
Discipline: punishment and spanking (1–9)	1.12 (0.95, 1.33)	1.19 (0.99, 1.42)	1.13 (0.95, 1.35)	1.06 (0.95, 1.18)
Affection: taken out to movies and play or read (1–7)	0.99 (0.80, 1.23)	1.08 (0.86, 1.35)	0.93 (0.73, 1.17)	1.07 (0.93, 1.24)

* $P < 0.05$; The reference category is no crime. The findings of nonserious crime were not reported; The independence of irrelevant alternatives (IIA) assumption of multinomial logit was not violated (χ^2=9.65 (13 df), P = 0.722 for males; χ^2=4.17 (13 df), P = 0.989 for females)