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## Early Childhood Predictors of Severe Youth Violence in Low-Income Males

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### Abstract

Using a cohort of 310 low-income males living in an urban community and followed prospectively from 18 months through adolescence (ages 15 to 18 years), the current study examined whether individual, family, and community risk factors from ages 18 to 42 months were associated with adolescents' violent behavior, as indexed by juvenile petitions. Results of multivariate analyses indicated that while family income was the only factor to discriminate those with no arrest record from those with *nonviolent* arrests, rejecting parenting, child oppositional behavior, emotion regulation, and minority status during the toddler period contributed unique variance in distinguishing adolescent males arrested for violent behavior compared to those never arrested and those arrested for nonviolent behavior. Implications for prevention efforts are discussed.

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There is great concern regarding the incidence of youth violence. Although violent behavior that involves mass murder or rampage violence receives extensive media coverage, acts of adolescent violent behavior with a single victim are far more common. For instance, juveniles accounted for 13.7% of violent crime (i.e., physical assault, rape, homicide, and robbery) arrests in 2010 (Federal Bureau of Investigation, 2011). Furthermore, threat of violence remains high, with 7.4% of high school students in 2011 having reported being threatened or harmed with a weapon on school grounds (Center for Disease Control, 2012). Despite the egregiousness of these violent acts, little is known about the developmental precursors of severe violent behavior during the first three years of life. Identifying these early developmental precursors is essential to informing and focusing prevention efforts (Shaw & Bell, 1993), as behaviors during the toddler period are less entrenched and more malleable than during the school-age period and adolescence (Reid, 1993). Additionally, although some research has begun tracing the antecedents of adolescent and young adult

antisocial behavior beginning in early childhood (Moffitt & Caspi, 2001; Shaw, Hyde, & Brennan, 2012), these studies typically combine violent and nonviolent antisocial acts instead of examining severe violent antisocial behavior specifically. It is possible that there are distinct differences in the early developmental precursors of adolescent violent and nonviolent antisocial behavior (Tremblay, 2006). The current study seeks to examine early childhood antecedents of adolescent violent behavior using a high-risk sample of low-income boys to determine whether developmental precursors of violent antisocial behavior differ from precursors of adolescent nonviolent antisocial behavior.

## Adolescents' engagement in violent versus nonviolent behavior

There is currently some debate regarding whether individuals “specialize” in one specific area of criminal behavior (e.g., commit only theft or only violence) or if engagement in violent behavior is just a severe form of antisocial behavior. While some researchers have posited that engagement in violent behavior may be stable for some individuals (Farrington, 1991; Loeber et al., 2008), others have suggested that because violent offenses constitute only a small proportion of crimes committed (Weiner, 1989), individuals who engage in violent behavior are simply chronic offenders who engage in more criminal behavior and are therefore more likely to commit a violent offense (for a review see Piquero, Jennings, & Barnes, 2012). Research supports that violent offenders are likely to also commit nonviolent crimes and have more criminal offenses than nonviolent offenders (Farrington, 1998). However, regardless of whether individuals “specialize” in violent crime, research that distinguishes violent from nonviolent offenders is warranted because violent offenders represent an especially high-risk group who are more likely to engage in frequent criminal behavior, have higher recidivism rates (Delisi & Piquero, 2011), and have distinct patterns of youth problem behavior (see below; Tolan & Gorman-Smith, 1998).

## Precursors of adolescent violence

In the current study, we incorporate the tenets of social-ecological and developmental psychopathology perspectives to guide our selection of risk factors and modeling of early childhood antecedents of youth violence (Cicchetti & Rogosh, 1996; Shaw, Bell, & Gilliom, 2000), examining how initial risk based on child characteristics are increased by the child's social context, including family and community domains. Whereas many studies have identified developmental precursors of general types of adolescent conduct problems beginning at school-age (e.g., Dodge et al., 2013), with notable exceptions (e.g., Dodge et al., 2008; Loeber et al., 2005), most research focused specifically on predictors of youth *violent* behavior has been initiated during adolescence. During early adolescence, predictors of youth violence have included individual (e.g., high levels of aggression, poor academic achievement), family (e.g., low levels of parental monitoring), and community risk domains (e.g., deviant peer affiliation, poverty, living in deprived neighborhoods; Loeber et al., 2005; Tolan, Gorman-Smith, & Henry, 2003). Some researchers have suggested an additive effect of risk factors for violent behavior (Hill, Lui, & Hawkins, 2001) with the strength and number of salient risk factors increasing throughout development (e.g., deviant peer affiliation becomes more influential later in development; Ingoldsby & Shaw, 2002; Lipsey & Derzon, 1998). These studies highlight the potential value of investigating risk factors for

violent behavior beginning in early childhood when there are fewer risk factors to address and those that are present may be more malleable to prevention efforts than in later childhood and adolescence (Reid, 1993). For instance, research suggests that parenting interventions during the toddler years can improve positive parent-child interactions and reduce later maternal depression and problem behavior (Dishion et al., 2008; Sitnick et al., 2014), just as interventions addressing maternal depression have been shown to reduce later disruptive behavior in young children, in some cases also increasing parenting quality (Sanders & McFarland, 2000; Shaw et al., 2009). Therefore, identifying unique predictors of adolescent violent behavior during early childhood may enable preventionists to design programs that target such predictors and prevent violent behavior in adolescence.

Of studies investigating risk factors of adolescent violence prior to adolescence, research has found support for both individual and familial risk factors contributing to later violent behavior as well as more distal risk factors. Research exploring individual risk factors has found associations between trajectories of aggressive and oppositional behavior from ages 6 through 15 and adolescent violent behavior, such that individuals with a trajectory of chronic high problem behavior were more likely to engage in violent behavior at age 17 (Nagin & Tremblay, 1999; Kokko et al., 2006). Further, these links were evident only for boys (Brody et al., 2003), with family socioeconomic adversity also uniquely contributed to increased risk of engaging in violent behavior (Arseneault et al., 2003). Dodge and colleagues (2008) investigated multiple domains of risk for engagement in violent behavior by utilizing a cohort of 754 children identified as being at-risk beginning the summer before first grade. The results supported a dynamic cascade model from school-age through adolescence, in which initial social disadvantage (i.e., socioeconomic risk and mothers' depression) predicted harsh and inconsistent parenting, which led to social and cognitive deficits, conduct problems, then academic, family, and peer problems during later childhood and early adolescence, ultimately leading to violent behavior in adolescence. Similarly, in a meta-analysis, Lipsey and Derzon (1998) found that conduct problems, being male, and family poverty at ages 6–11 were the most salient predictors of adolescent violent behavior. Research investigating risk factors of a specific violent crime, homicide, also supports the impact of multiple domains of risk (i.e., individual, family, socioeconomic) beginning in middle childhood (Loeber et al., 2005). Despite the contributions of these studies, there is a dearth of prospective longitudinal research initiated prior to the preschool period that has examined early childhood predictors of *violent* behavior. Specifically, no prior research has attempted to identify risk factors distinguishing violent from nonviolent or non-antisocial behavior beginning prior to age six.

### **Early childhood precursors of antisocial behavior**

Social-ecological and developmental psychopathology theories suggest that children's individual characteristics (e.g., temperament) remain influential on development while both influencing and being influenced by more proximal (e.g., parenting) and distal systems (e.g., poverty) over time (Cicchetti & Rogosch, 2002). Although research on early childhood precursors of youth violent behavior is limited, research on early childhood precursors of youth antisocial behavior, which includes violent and nonviolent problem behavior, supports the use of an ecological framework that incorporates both distal and proximal factors to

investigate risk (see below). Based on the limited research focusing specifically on predictors of violent crime, we use theory and past empirical work on the developmental precursors of violent and nonviolent antisocial behavior to inform our perspective (Shaw & Bell, 1993) and to address whether these early risk factors are unique to children who later engage in violent or nonviolent antisocial behavior.

### Individual risk factors

As previously discussed, aggressive and oppositional behavior as young as age 6 has been associated with adolescent violent behavior (Brody et al., 2003; Nagin & Tremblay, 1999; Kokko et al., 2006). Additionally, oppositionality during the toddler period has been associated with less severe forms of conduct problems in the preschool period (Shaw et al., 1998a). As postulated by Patterson (1982), oppositional and other types of toddler-age disruptive behavior may lead to early-starting conduct problems by taxing parent management skills, often leading to higher rates of parent-child coercion and increases in multiple types of disruptive behavior as parents unwittingly model more aggressive strategies to children in attempts to secure child compliance (Shaw et al., 1998b, 2003).

Emotion regulation is an additional well established individual risk factor for later antisocial behavior that is evident as early as the preschool age (Caspi, Henry, McGee, Moffitt, & Silva, 1995; Moffitt & Caspi, 2001). Theoretically, young children who are less able to regulate their emotions would be more prone to be less compliant, more oppositional and aggressive in interactions with adults, siblings, and peers, leading to cascading pathways that ultimately lead to more severe forms of antisocial behavior, including violent behavior (Shaw et al., 1993, 2000). Researchers have found both direct (Caspi et al., 1995) and indirect links from dysregulated emotion to later problem behavior. Indirect pathways include poor emotion regulation leading to increased peer rejection and deviant peer affiliation (Trentacosta & Shaw, 2009) and increased aggression (Davidson, Putman, & Larson, 2000) leading to subsequent antisocial behavior. Although poor emotion regulation and child oppositionality during early childhood can be problematic outcomes for children unto themselves, it is the potential for each of these behaviors to escalate into more serious types of antisocial behavior as children develop that makes them pertinent to the current study, especially when considering that past research suggests that early interventions have the potential to mitigate their negative effects (Bierman et al., 2010; Izard et al., 2008). Thus, we anticipate that both oppositionality and poor emotion regulation during early childhood will be linked to adolescent violent behavior and nonviolent behavior when compared to adolescents with no history of criminal behavior.

### Proximal risk factors

Focusing primarily on within-family factors because of the child's relatively greater psychological and physical dependence on parents during the toddler period relative to middle childhood and adolescence (Shaw & Bell, 1993), many efforts have focused on parenting, and how hostile, harsh, and rejecting parenting strategies have been consistently linked to antisocial behavior during middle childhood and adolescence, whereas warm and nurturing parenting has been associated with low levels of later antisocial behavior (Shaw et al., 2012; Caspi et al., 2002). Additionally, exposure to maternal depression during the

toddler period also has been associated with increased risk of general types of antisocial behavior (Fergusson & Lynskey, 1993), including within the current sample (Shaw et al., 2012).

### **Distal risk factors**

Poverty, socioeconomic status, minority status, and residence in disadvantaged neighborhoods are associated with adolescents' increased risk of engaging in antisocial behavior (Shaw, Winslow, Owens, & Hood, 1998a; Tremblay et al., 2004), and in impoverished, urban communities in the United States, more distal risk factors, such as neighborhood risk, have been found for children as young as age 3 or 4 (Ingoldsby & Shaw, 2002; Leventhal, et al., 2000). These distal risk factors are closely related to one another. For instance, disadvantaged neighborhoods by their very definition are comprised largely of people living in poverty, and minorities are disproportionality overrepresented in families living in poverty. Moreover, individuals living in disadvantaged neighborhoods are more likely to engage in and be a victim of violent crime as a result of their socioeconomic status (Blau & Blau, 1982). Furthermore, the pervasive nature of these contextual factors can limit parents' access to appropriate resources for their children and exacerbate risk for children (e.g., community violence) and parents (e.g., decrease parental well-being and compromise parenting quality).

### **The current study**

Whereas past studies on early prediction of general indices of antisocial behavior have been informative, they have their limitations. Past studies of antisocial behavior typically have not distinguished violent and nonviolent forms of antisocial behavior; therefore, it is difficult to determine if one specific form of behavior is driving the results. In fact, as violent behavior is much less common than nonviolent antisocial behavior, it is quite possible that much of past research is driven by prediction of nonviolent antisocial behavior. Whereas some studies have found evidence for the generality of offending in both adults (Farrington, 1991) and adolescents (Capaldi & Patterson, 1996), suggesting that early predictors of later violent offenses do not uniquely differ from nonviolent offenses, others have argued that distinct differences remain for antecedents of later nonviolent and violent antisocial behavior (Tremblay, 2006). Regardless, research on early childhood antecedents of antisocial behavior is needed to inform the debate as to whether it is possible to truly distinguish between risks for later violent and nonviolent antisocial behavior beginning in early childhood.

The current study aims to identify whether risk factors from individual, family, and community domains during the first three years of life can distinguish between juvenile arrest records of violent, nonviolent, and non-offending adolescent boys. Although we recognize the importance of cascading and mediational models spanning from early to late childhood and adolescence (e.g., Dodge et al., 2008), because of our focus on early identification and its implications for prevention, we limit assessment of risk factors to the first 3.5 years. As noted earlier, based on the developmental challenges of the toddler period (Shaw & Bell, 1993), we hypothesize that the challenges associated with the toddler period

might provide a critical window from which to assess risk for severely dysregulated behavior during late adolescence, in the form of violent offenses. Specifically we hypothesize that higher levels of child oppositionality and lower levels of emotion regulation in early childhood will increase the likelihood of engagement in violent crime and nonviolent crime when compared to adolescents who do not engage in criminal behavior; however, we anticipate that dysregulated emotion during early childhood will be more pronounced for adolescents who commit violent crime when compared to those who commit nonviolent crime because of the impulsive nature of many violent acts (Woodworth & Porter, 2002). Further, we hypothesize that indices of proximal family risk (i.e., harsh parenting and mother's depression) and levels of poverty and neighborhood deprivation will increase the likelihood of adolescent violent crime and nonviolent crime when compared to those who did not engage in criminal behavior, but levels of harsh parenting would further distinguish adolescents who engaged in violent crime from those who engage in nonviolent crime. Additionally, we investigate the potential for race to moderate the effects of early contextual factors on later violent behavior based on racial disparities in the quality of resources and discriminatory practices for African Americans. Based on the racial disparities in arrests rates of minorities (Austin & Allen, 2000), we anticipated that minority status would increase the likelihood of adolescents being convicted of violent or nonviolent crime compared to nonoffenders but did not anticipate minority status to distinguish between violent and nonviolent offenders. We examine these research questions in the context of poverty, which further raises the level of adversity for youth. Finally, unlike prior work, we distinguish between juveniles arrested for violent versus nonviolent behavior and those with no arrest record.

## Method

### Participants and Procedures

Participants in this study are part of the Pitt Mother & Child Project (PMCP), an ongoing longitudinal study of vulnerability and resilience in boys from low-socioeconomic backgrounds. The study has been approved by the University of Pittsburgh IRB (protocol #PRO09020252). Participants were recruited from the Women, Infants and Children (WIC) program in the Pittsburgh Metropolitan area (Shaw, Gilliom, Ingoldsby, & Nagin, 2003). As the original intent of the study was to examine precursors of antisocial behavior, the study was restricted to boys because of their higher rates of serious antisocial behavior later in childhood and adolescence relative to girls. During the course of recruitment, 421 families were approached at WIC sites. Of the families who were approached, 310 (73.6%) participated in the first assessment (3.3% declined to participate at the time of recruitment and an additional 23.0% declined before the first assessment). Fifty-three percent of the target children in the sample were European American, 36% were African American, 5% were biracial, and 6% were of other races (e.g., Hispanic American or Asian American). At the initial assessment, when boys were 18-months-old, the age of mothers ranged from 17–43 years ( $M = 27.82$ ,  $SD = 5.33$ ) and two thirds of mothers in the sample had 12 years of education or less. When the boys were 18 months, 44% of the mothers indicated that they were married, 21% were living together, and the remaining 35% were single, separated or divorced. The mean per capita income was \$241 per month (\$2,892), and the mean



Hollingshead (1975) SES score was 24.5, indicative of impoverished to working class families. Data collection for the current study took place from the year 1991 to 2009.

The current study utilizes data from 2- to 3-hour visits from home and/or laboratory assessments at child ages 18, 24 and 42 months. During these assessments mothers completed questionnaires regarding socio-demographic characteristics, family issues (e.g., parenting, family members' relationship quality, maternal well-being), and child behavior. Parent-child interaction tasks were videotaped for later coding, as was the child cookie task to assess child emotion regulation (discussed below). Retention rates were high with 98% of participants returning at age 24 months and 95% at 42 months. Additionally, juvenile court records from Allegheny County, PA were collected when the boys were between 15.9 and 18 years of age. Analyses were limited to the boys for whom court data were available, resulting in 272 participants. Data were determined to be missing at random, as those with missing data did not differ from those with data on any of the other study variables.

## Measures

**Child Oppositional Behavior**—When the boys were 18 months of age, mothers completed the 103 item Toddler Behavior Checklist (TBC; Larzelere, Martin & Amberson, 1989) to assess disruptive and emotional problem behavior. Mothers rated boy's behavior in the past month on a 4-point scale. The 22-item oppositional subscale was used for these analyses. Items were summed and sample items include "hits adults" and "is disobedient at home ( $\alpha = .90$ ).

**Child emotion regulation**—To assess emotion regulation, boys were administered a delay of gratification task at 42 months of age – the cookie task (Marvin, 1977), which required children to wait for a cookie in a room that was cleared out of all other toys while their mother completed a questionnaire. Mothers were given a transparent bag containing the child's preferred cookie and were instructed to keep the cookie within the boy's view but out of reach for three minutes. Boys' emotion regulation was coded into five mutually exclusive behaviors: active distraction, passive waiting, physical comfort seeking, focus on delay object, and information gathering, and the display of anger (for more details see Gilliom et al., 2002). The presence or absence of regulation behaviors was coded in 10-second intervals. Inter-rater reliability ranged from 0.64 to 0.79. For the current study, active distraction (intentionally shifting focus of attention away from the desired object to engage in other activities) was utilized based on past research supporting its use as an effective emotion regulation strategy and predictive of reduced risk for later antisocial behavior (Gilliom et al., 2002; Grolnick et al., 1996).

**Mothers' depressive symptomatology**—Mothers completed the Beck Depression Inventory (BDI; Beck, Steer, & Ranieri, 1988) when their sons were 18 and 24 months of age. The BDI is a widely used measure of depressive states that is reliable and found to be valid in clinical and community populations. Mothers rated the intensity of 21 symptoms (e.g., feeling sadness) and characteristics of depression on a 4-point Likert scale in the past 6 months. Scores at each age were summed and then a mean composite of the two years was



computed because scores were significantly correlated ( $r = .672, p < .001$ ;  $\alpha = .83$  at both 1.5 and 2 years).

**Rejecting parenting**—Maternal rejecting parenting was measured at ages 18 and 24 months using the Early Parenting Coding System (EPCS), which was designed to measure a range of parenting behaviors typically exhibited in interactions with young children (Shaw et al., 1998b). Observer ratings of parenting were made from videotaped mother–child interactions during a structured clean-up task at the 18 and 24 month lab assessments. The EPCS consists of 9 categories of parenting strategies coded molecularly as well as six global ratings (for more detail see Winslow, Shaw, Bruns, & Kiebler, 1995). For the purposes of the present study, only molecular and global ratings relevant to rejecting parenting were employed. These included two molecular ratings—verbal/physical approval and critical statement—as well as three global ratings—hostility, warmth, and punitiveness. Hostility was defined as the emotional expression of anger by the mother toward the child as indicated by tone of voice and mannerisms. The warmth rating was an evaluation of the amount of positive affect expressed toward the child. Punitiveness was defined as the extent to which the mother was too strict, demanding, or harsh, considering the child’s behavior. Global scores were rated on a three-point scale by coders. For molecular codes, Cohen’s kappa coefficients were .85 for approval and .75 for critical statement. For global ratings, weighted kappa coefficients were .84, .81, and .89 for hostility, warmth, and punitiveness, respectively. Coders were blind to scores on all other measures used in the study. Principal components analysis was used to derive a factor of rejecting parenting at 18 and 24 months (see Shaw et al., 1998a for more details), with alpha coefficients for the rejecting parenting factor .68 at 18 months and .70 at 24 months. At 18 and 24 months, z-scores were computed and then averaged. As scores across ages were significantly correlated ( $r = .32, p < .001$ ), a mean score was then calculated at ages 18 and 24 months to reduce missing data.

**Demographics**—Mother’s report of *minority status* (0 = European American, 1 = other races and ethnicities) was included as a covariate in the analyses. A mean composite of mother’s report of *family income per year* at 18 and 24 months of age were included as covariates as income at each year was significantly correlated ( $r = .763, p < .001$ ). Finally, *neighborhood risk* was geocoded at the block group level when the target child was 18 and 24 months of age (see Winslow & Shaw, 2007) to 1990 United States Bureau of the Census data. The following census block group level variables were used to generate a neighborhood risk variable: (1) median family income, (2) percent families below poverty level, (3) percent households on public assistance, (4) percent unemployed, (5) percent single-mother households, (6) percent African American, (7) percent Bachelor degree and higher. These individual variables were standardized, summed (after reverse scoring median family income and percent Bachelor’s degree), and then averaged to create an overall neighborhood disadvantage score for each block group (see Winslow & Shaw, 2007 for more detail). A mean score of neighborhood risk at ages 18 and 24 months was used in the current analyses.

**Juvenile court records**—To assess each boy’s involvement with the legal system, juvenile court records were obtained from Allegheny County, PA where the vast majority of

participants resided. The juvenile court records were obtained on annually from ages 15 to 18. For the purposes of the current study, juvenile petitions were used to minimize the potential for social class and race to influence the outcome of the court proceedings as petitions are filed after the arrest but prior to court proceedings and are equivalent to the number of criminal charges pressed against the boy in this state. Research suggests that these demographic characteristics are more influential in the filing of dispositions than petitions (Minor, Hartman, & Terry, 1997). Petitions were used to group each participant into one of three groups: *nonoffenders*, *nonviolent offenders*, and *violent offenders*. If court records could not be obtained for a boy, these data were considered missing (87% of participants had data). Similar to classification methods utilized in past research (Ford & Linney, 1995; Gretton, Hare, & Catchpole, 2004; Herrenkohl et al., 2000; Hoaken, Allaby, & Earle, 2007), boys with a petition for violent acts or threat of violent acts were categorized as *violent offenders*. The following petitions were included in this category for their harm or potential for harm to others: homicide and attempted homicide, forcible rape, indecent and sexual assault, aggravated assault, robbery, arson, and weapons possession. Those with petitions for other illegal, but nonviolent, acts (e.g., vandalism, marijuana possession) were classified as *nonviolent offenders*. Finally, those with no juvenile records were classified as *nonoffenders*. For bivariate analyses variables were dummy coded such that nonoffenders were the comparison group.

**Number of court petitions**—As a past study of differences in precursors of adolescent violent and nonviolent behavior found that after controlling for the number of arrests other risk-factors were no longer significant in distinguishing violent from nonviolent offenders (Capaldi & Patterson, 1996), the number of petitions filed against each boy was included as a covariate in the comparison of violent and nonviolent offenders.

### Data Analyses

All analyses were conducted using SPSS Statistics 21 (IBM Corp, 2013). Family income was skewed and therefore log transformed prior to analyses. All continuous variables were mean centered. Based on the categorical nature of the dependent variable, multinomial logistic regressions were conducted with three comparisons: violent offenders versus nonviolent offenders, violent offenders versus nonoffenders, and nonviolent offenders versus nonoffenders. An iterative process was used in which all of the predictors that were significant in the bivariate analyses were included in the initial regressions and subsequent analyses resulted in eliminating those predictors that were no longer significant in the multivariate analyses. Next, separate regressions were computed that investigated minority status as a potential moderator of rejecting parenting, emotion regulation, and oppositional behavior.

### Results

In the categorization of juvenile arrest records, 53 (19.5%) participants were categorized as violent offenders, 53 (19.5%) as nonviolent offenders, and 166 (61%) as nonoffenders. It is noteworthy that of the 53 violent offenders, 47 also had nonviolent petitions. Descriptives for all variables are presented in Table 1. Nonparametric correlations revealed that violent

offender group status was significantly correlated with all predictors ( $p < .05$ ; see Table 2) except mother's depressive symptoms. Conversely, nonviolent offender group status, was only significantly correlated with number of petitions ( $r = .402$ ,  $p < .001$ ). Initial multivariate analysis was conducted with all of the previously discussed variables (i.e., mothers depressive symptoms, rejecting parenting, oppositional behavior, emotion regulation, income, neighborhood risk, number of petitions, and minority status) included as predictors of group membership. Because maternal depressive symptoms and neighborhood disadvantage were not significant within a multivariate framework, they were excluded from subsequent analyses. Additionally, the number of petitions filed was not significant in the comparison between violent and nonviolent offenders, nor did the pattern of significance change for the other independent variables in the analyses with this covariate added; however, for purposes of comparison with past studies (e.g., Capaldi & Patterson, 1996), the number of petitions was retained in the final analyses. It is noteworthy though, that number of petitions did not significantly contribute to or change the results. In the analyses of moderation, the interactions between minority status and rejection parenting, emotion regulation, and oppositional behavior were not significant and therefore are not reported.

The final multinomial logistic regression results are presented in Table 3. The overall model was significant at the .01 level ( $\chi^2 = 50.976$ ,  $df = 10$ ) indicating acceptable fit; the Nagelkerke's Pseudo R-square was 0.259. Results indicated that family income at 18 and 24 months was the only significant predictor in distinguishing between nonoffenders and nonviolent offenders (OR = 0.444, 95% CI [0.212, 0.930],  $p < .05$ ), such that an increase in family income increased the odds that the participant would be placed in the nonoffending group relative to the nonviolent group. When comparing nonoffenders to violent offenders, family income (OR = 3.467, 95% CI [1.402, 8.573],  $p < .01$ ), oppositional behavior (OR = .948, 95% CI [0.911, 0.987],  $p < .01$ ), emotion regulation (OR = 1.110, 95% CI [1.018, 1.211],  $p < .05$ ), and minority status (OR = 3.80, 95% CI [1.33, 10.832],  $p < .05$ ) were significant in the final model, such that minority status and higher levels of 18-month oppositional behavior increased the odds of being in the violent offenders group, and higher levels of family income and emotion regulation during early childhood decreased the odds of being in the violent offenders group relative to nonoffenders. Finally, lower levels of emotion regulation (OR = 1.142, 95% CI [1.012, 1.289],  $p < .05$ ) and higher levels of rejecting parenting (OR = .171, 95% CI [0.041, 0.706],  $p < .05$ ) during early childhood distinguished violent offenders from nonviolent offenders such that higher levels of emotion regulation decreased the odds of being in the violent offenders group and higher levels of rejecting parenting increased the odds of being in the violent offenders group relative to the nonviolent offenders. It is noteworthy that an alternative model was computed in which emotion regulation at 42 months was substituted with mother's report of child's emotional instability from the TBQ at 18 months to assess emotion regulation at an earlier time point. Results indicated the same pattern of significant results. However, the model with observed emotion regulation at 42 months was retained in the final model because of the method variance that observations of behavior provides.

## Discussion

The current study is one of the first to utilize longitudinal, prospective data from multiple methods to assess risk factors for adolescent violent behavior during the first three years of life. Although previous studies have established risk factors for general antisocial behavior during early childhood and risk factors for adolescent violent behavior during middle childhood, this study was able to distinguish risk for violent and nonviolent antisocial behavior in early childhood. The results not only suggest that there are multiple early childhood precursors of violent versus nonviolent offending during adolescence, but that such early childhood child and family factors appear to be more powerful in discriminating violent from nonviolent behavior than in predicting general types of adolescent antisocial behavior (Shaw, Hyde, & Brennan, 2012). Specifically, adolescent offenders who were arrested for *violent* crimes during adolescence were more likely to experience harsh parenting and have lower emotion regulation skills during early childhood than those who were arrested for nonviolent crimes *only*. However, when compared with adolescents with no juvenile arrests, violent offenders were more likely to live in poverty, be rated as more oppositional by their parents, have poorer emotion regulation ability, and be of minority status. However, rejecting parenting during early childhood failed to discriminate between nonoffenders and violent offenders. Conversely, family income was the only significant factor that distinguished nonviolent offenders from adolescents with no criminal history. It is noteworthy that minority status was a significant predictor of violent criminal behavior relative to both nonviolent offenders and nonoffenders, but did not distinguish nonviolent offenders from nonoffenders. Contrary to our hypothesis that minority status would also discriminate nonoffenders from nonviolent offenders and nonviolent offenders from violent offenders, the current results support past research which suggests that minority status, specifically being African-American, increases the likelihood of engaging in violent (versus nonviolent) crime during adolescence. However, this racial disparity could be due to socioeconomic and contextual factors that are confounded with race in the current sample (Sampson, Morenoff, & Raudenbush, 2005).

Interestingly, despite initial bivariate analyses indicating that neighborhood risk was associated with committing a violent criminal offense, neighborhood risk was nonsignificant in the multivariate analyses. In contrast, family income was a significant risk factor. This is contrary to research from Osgood and Chambers (2000) which suggested that neighborhood context was a more salient predictor of adolescent violence than poverty. However, it is possible that multicollinearity was an issue for neighborhood risk with both income and race (i.e., highly confounded in the current sample). To examine this issue, additional analyses were conducted that supplanted family income with neighborhood risk. However, in these analyses neighborhood risk remained nonsignificant suggesting that multicollinearity with income was not responsible for this null finding. Finally, it is possible that while other studies have more consistently found neighborhood risk to be a salient predictor of adolescent violence, these direct effects are typically mediated by more proximal factors (e.g., parenting) during early childhood (Ingoldsby & Shaw, 2002) before children start spending more unsupervised time in the neighborhood (Leventhal & Brooks-Gunn, 2000).

As anticipated, adolescents with violent petitions also had high rates of engagement in nonviolent crime. However, even after accounting for the number of petitions adolescents received, the pattern of results did not change. This is in contrast to work by Capaldi and Patterson (1996), conducted with a lower-risk sample living in a suburban context, which suggested that the number of arrests was the only predictor of violent arrests during *adolescence*. It is possible that, as suggested by Tremblay (2006), there are unique risk factors emerging during early childhood that are linked to risk for later violent crime.

In their review of preventative measures of adolescent violence, Fields and McNamara (2003) discuss the importance of providing interventions to prevent violent behavior prior to adolescence. Developmentally, early childhood is an optimal time for initiating prevention efforts because of the greater malleability of child and parenting behavior relative to later age periods (Reid, 1993). Past research utilizing cascade models to explore developmental pathways leading to antisocial behavior during adolescence suggest that many risk factors for such cascades can be identified in early childhood (Dodge et al., 2008) and if targeted, successfully prevent the development of conduct problems in early and middle childhood (Shaw et al., 2006, Dishion et al., 2008, 2014), even among those living in poverty (Shaw et al., in press). Results of the current study suggest that interventions that target toddlers and preschoolers with poor emotion regulation skills and high oppositionality warrant further investigation in preventing later violent behavior, particularly among children living in low-income, urban communities. Indeed, the High Scope Perry Preschool Study found that preschool interventions and parent support for at-risk children were linked to fewer violent offenses during adolescence and into adulthood (Schweinhart et al., 2005). Other early childhood interventions have also had success in addressing the risk factors linked to violent behavior in the current study. For example, the Promoting Alternative Thinking Strategies curriculum (Domitrovich, Cortes, & Greenberg, 2007) and the Family Check-Up (Dishion et al., 2008) have been linked to improvements in young children's problem behavior and emotion regulation (Shelleby et al., 2012; Dishion et al., 2014) with increases in positive parenting and decreases in maternal depression often mediating the relation between the intervention and children's decreased problem behavior (Dishion et al., 2008; Shaw et al., 2009; Sitnick et al., 2014). While the purpose of the current study was only to identify risk factors for adolescents' violent criminal behavior, further research is needed to investigate whether prevention efforts that focus on these malleable family and child factors during early childhood can help prevent adolescents' violent behavior.

Some study limitations should be noted. Participants were limited to boys from low-income families living in an urban setting. Therefore, the findings may not be generalizable to girls and children from higher SES families or nonurban settings. Whereas the use of court records is advantageous in providing an objective index of violent and nonviolent antisocial behavior and prohibiting the possibility that associations between early childhood risk factors and adolescent antisocial behavior were influenced by reporter or informant bias, use of court records may significantly underestimate the frequency of antisocial behaviors committed, as antisocial activities were limited to only those individuals who were arrested and had petitions brought against them. However, research suggests that the existence of a violent referral during adolescence is directly related to the length of that individual's violent career (Snyder, 1998) highlighting the importance of targeting juveniles who have

been arrested. Further, self-report measures of violent crime can often be ambiguous and missing in the most violent offenses (Reiss & Roth, 1993). While we are aware of the limitations of using arrest records, we are also aware of their advantages (e.g., Farrington, 2003; Forrest, Edwards, & Vassallo, 2014). Finally, as we only had access to court records collected in Pennsylvania, it is possible that some participants had additional offenses out of state.

Despite these limitations, the current study is the first to investigate precursors of adolescent violence during early childhood from multiple domains and informants in an at-risk sample, and the first to distinguish between risk factors for adolescent violent and nonviolent behavior. While prevention efforts that focus on families living in poverty and with children who exhibit problem behavior may benefit everyone by reducing later criminal behavior, it seems that prevention programs initiated during early childhood that specifically target improvements in parenting and children's emotion regulation may have the potential to reduce future rates of violent crime.

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**Table 1**

Descriptive Statistics for Sample

	M	SD	Range
Oppositional behavior - 18 months	32.95	11.52	.00 – 65.00
Emotional regulation - 42 months	10.65	5.08	1.00 – 18.00
Mother's depressive symptoms - 18 & 24 months	8.584	6.59	.00 – 45.00
Rejecting parenting - 18 & 24 months	.00	0.51	-1.06 – 2.48
Family monthly income - 18 & 24 months	1067.47	635.40	205.00 – 4,000.00
Neighborhood risk - 18 & 24 months	.41	1.18	-2.04 – 3.10
Number of petitions (limited to nonviolent and violent offenders)	2.35	1.60	1–8
Minority status	<i>n</i> = 136 (50%)		
Violent offenders	<i>n</i> = 53 (19.5%)		
Nonviolent offenders	<i>n</i> = 53 (19.5%)		
Nonoffenders	<i>n</i> = 166 (61%)		

*Note.* Court petitions groupings were dummy coded such that nonoffenders is the reference group with those classified as having a violent offense have a score of 1 for the violent offenders variable and those nonviolent offenders have a score of 1 for the nonviolent offenders variable.

**Table 2**

Correlations

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Violent offenders	1.0								
2. Nonviolent offenders	-.242 <sup>***</sup>	1.0							
3. Mother's depressive symptoms 18 & 24 months	.099 <sup>t</sup>	.078	1.0						
4. Rejecting parenting 18 & 24 months	.123 <sup>*</sup>	-.025	.042	1.0					
5. Oppositional behavior 18 months	.141 <sup>**</sup>	.000	.090 <sup>*</sup>	.008	1.0				
6. Emotion Regulation 42 months	-.175 <sup>***</sup>	.065	.005	.041	.023	1.0			
7. Family income 18 & 24 months	-.213 <sup>***</sup>	-.085	-.136 <sup>***</sup>	-.220 <sup>***</sup>	-.063	.086 <sup>t</sup>	1.0		
8. Neighborhood risk 18 & 24 months	.171 <sup>**</sup>	.096 <sup>t</sup>	.075	.166 <sup>***</sup>	.037	-.004	-.336 <sup>***</sup>	1.0	
9. Number of petitions	.640 <sup>**</sup>	.402 <sup>***</sup>	.135 <sup>**</sup>	.105 <sup>*</sup>	.094 <sup>t</sup>	-.142 <sup>**</sup>	-.255 <sup>**</sup>	.210 <sup>**</sup>	1.0
10. Minority status	.211 <sup>**</sup>	.090	.116 <sup>*</sup>	.123 <sup>*</sup>	-.006	-.100 <sup>t</sup>	-.343 <sup>***</sup>	.521 <sup>***</sup>	.241 <sup>***</sup>

<sup>t</sup>  $p < .10$

\*  $p < .05$

\*\*\*  $p < .01$

Note: Nonparametric correlations are reported for the categorical variables minority status and court petition grouping. Court petitions groupings were dummy coded such that nonoffenders is the reference group with those classified as having a violent offense have a score of 1 for the violent offenders variable and those nonviolent offenders have a score of 1 for the nonviolent offenders variable.

**Table 3**

Multinomial Logistic Regression Results

	Nonoffenders <sup>a</sup> vs. Nonviolent offenders		Violent offenders <sup>a</sup> vs. Nonoffenders		Violent offenders <sup>a</sup> vs. Nonviolent offenders			
	$\beta$	<i>p</i> -value	$\beta$	<i>p</i> -value	$\beta$	<i>p</i> -value		
Family income 18 & 24 months	-.812	.031	.444	1.243	.007	3.467	.533	1.450
Rejecting parenting 18 & 24 months	-.555	.211	.574	-.612	.138	.542	-1.766	.171
Oppositional behavior 18 months	.009	.587	1.009	-.053	.010	.948	-.047	.954
Emotion Regulation 42 months	.004	.918	1.004	.105	.007	1.110	.133	1.142
Minority status	.196	.630	.822	-1.335	.013	3.800	-1.225	.047
Number of petitions							-.158	.442
								.854

*Note.*

<sup>a</sup>Indicates the reference group. Number of petitions only included in comparison of violent and nonviolent offenders as nonoffenders did not have any petitions