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Antecedents and Correlates of the Popular-Aggressive Phenomenon in Elementary School

Philip C. Rodkin and

Departments of Educational Psychology and Psychology, University of Illinois at Urbana-Champaign

Glenn I. Roisman

Department of Psychology, University of Illinois at Urbana-Champaign

Abstract

This study identified correlates and developmental antecedents that distinguish popular-aggressive elementary school children from other youth. Drawing on the NICHD Study of Early Child Care and Youth Development ($N = 1022$), popular-aggressive children were identified through teacher ratings over grades 3–6. Potential correlates included social competence as rated by observers, mothers, and teachers. Potential developmental antecedents included cognitive functioning, maternal sensitivity, and participation in child care through age 4.5. Multinomial regressions allowed for the determination of group differences net of covariates such as gender, ethnicity, maternal education, and income-to-needs. Results showed that popular-aggressive elementary school children were distinguished from other youth as having had an extensive child care history. Discussion focuses on developmental associations between child care quantity and aggression.

The paradox of aggressive behavior is that it is simultaneously adaptive and maladaptive (Milgram, 1976). What makes aggression maladaptive is all-too-obvious: Aggressive children endanger others, and are themselves at-risk from early in life for a host of serious adjustment problems. What makes aggression adaptive is also well-documented (Rodkin & Wilson, 2007). Aggression is highly evolved over phylogeny (Pellegrini, 2007), is often successful in changing other's behavior (Farmer, Xie, Cairns, & Hutchins, 2007), and can be used to acquire resources and maintain group boundaries (Hawley, 2007). Indeed, the functionality of aggressive behavior is such that Cairns (1979, p. 170) understood the relevant question for behavioral scientists to be not “*why* aggression?” but “*why not* aggression?”

One manifestation of the dual adaptive-maladaptive nature of aggression is the presence of a small group of children who are simultaneously aggressive and popular with their peers (Bagwell, Coie, Terry, & Lochman, 2000; Estell, Cairns, Farmer, & Cairns, 2002; Farmer, Estell, Bishop, O'Neal, & Cairns, 2003; LaFontana & Cillessen, 2002; Lease, Musgrove, & Axelrod, 2002; Luthar & McMahon, 1996; Rodkin, Farmer, Pearl, & Van Acker, 2000). Much of this research has been person-oriented: that is, focused on the co-occurrence of high popularity and high aggression among certain children. For example, Rodkin et al. (2000) cluster analyzed teachers' ratings of the popularity, aggression, and other personality characteristics of 450 fourth through sixth grade boys, finding popular-aggressive (“Tough”) and popular-nonaggressive (“Model”) configurations. Boys in the Tough configuration were seen by peers and viewed themselves as popular, cool, aggressive, and athletic—but not

prosocial, shy, friendly, or academically oriented. In contrast, Model boys were viewed by peers and themselves as popular, athletic, academically-oriented, friendly, outgoing, and nonaggressive. Model and Tough boys were classroom leaders, affiliating with one another (Farmer et al., 2002) and setting the tone for who and what was cool (Rodkin, Farmer, Pearl, & Van Acker, 2006).

Complementing this literature are variable-oriented studies that show no relationship or significant positive associations between continuously distributed measures of popularity and aggression assessed over whole samples (Cillessen & Mayeux, 2004; Gest, Sesma, Masten, & Tellegen, 2006; Parkhurst & Hopmeyer, 1998; Prinstein & Cillessen, 2003; Rose, Swenson, & Waller, 2004; Schwartz, Gorman, Nakamoto, & McKay, 2006; Vaillancourt & Hymel, 2006; Xie, Li, Boucher, Hutchins, & Cairns, 2006; Zeller, Vannatta, Schafer, & Noll, 2003). Whether personified in the “Tough,” popular-aggressive child, or as reflected in bivariate associations, the co-occurrence of popularity and aggression has been demonstrated across early childhood (e.g., Estell et al., 2002), middle childhood (e.g., Rodkin et al., 2000), and adolescence (e.g., Vaillancourt & Hymel, 2006).

Although popular-aggressive children have been identified across development, early factors that enable a coupling between popularity and aggression are not clear (Cillessen & Mayeux, 2007). There are no studies of popular-aggressive children that extend from early childhood to early adolescence, infrequent use of observational measures in this literature (but see Pellegrini, 2007; Pepler, Craig, & Roberts, 1998), and relevant study designs have not assessed broad domains of developmental functioning such as cognition and parenting that at least theoretically might distinguish aggressive children who are versus are not popular. Thus, the goal of this study was to identify correlates and antecedents that distinguish popular-aggressive elementary school children from other youth, particularly other aggressive children who are not popular.

Study questions were addressed using data from the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development (SECCYD). The NICHD SECCYD is well-suited for evaluating the early developmental history of popular-aggressive children. Children in the NICHD SECCYD have been followed longitudinally from infancy to age 15 (and age 17.5 year assessment is ongoing). Multiple teacher ratings of popularity and aggression are available. Covariates that may function as selection factors and/or confounds (e.g., sex, ethnicity, family income-to-needs, and maternal education) are included. The sample is also large enough to identify the infrequent configuration of popular-aggressive children. In the present study, the concurrent social competence and disruptiveness of popular-aggressive children as rated by mothers, teachers, and classroom observers was first determined. Two early developmental resources widely regarded as protective of adaptation, high cognitive functioning and sensitive parenting (Masten, 2001), were next evaluated. Finally, effects were determined for the social factor of participation within the early peer ecology of child care, a developmental context that been implicated in the generation of aggressive behavior (Dmitrieva, Steinberg, & Belsky, 2007).

Social competence should correlate with popular-aggressiveness. An image of the sophisticated, ruthless, acquisitive child pervades scholarship on the popular-aggressive phenomenon (e.g., Hawley, 2007; Sutton, Smith, & Swettenham, 1999; Vaughn, Vollenweider, Bost, Azria-Evans, & Snider, 2003). Hawley (2002, 2007) identified children who are bistrategic controllers, meaning that they use both prosocial and coercive means to obtain resources. Bistrategic controllers are distinguished from other aggressive children through their *savoir-faire*, ability to impress others, and “moral astuteness” (Hawley, 2007, p. 15). Thus, popular-aggressive children, compared to other aggressive children, should

score higher on observer reports of social competence—though perhaps not on measures of social skills as rated by parents and teachers who heavily emphasize compliance.

Developmental antecedents that may distinguish popular-aggressive children from aggressive children who are not popular include early maternal sensitivity and high cognitive functioning. Clearly, the protective resources of high cognitive functioning and maternal sensitivity can promote peer social capital in middle childhood. Studies on popularity and aggression examine factors such as academic engagement and grades (e.g., Rodkin et al., 2000; Schwartz et al., 2006), but for popular-aggressive children, it may be necessary to assess cognition early, before the advent of school disengagement and conflict. The possibility that popular-aggressive children have acquired social resources through effective parenting has simply not been evaluated, as studies of popularity and aggression have tended not to include parenting or family constructs. However, maternal sensitivity has had large and broad effects on developmental adaptation in previous reports of the NICHD Early Child Care Research Network (ECCRN; e.g., 2003b; see also Thompson, 2009).

Although it is possible that the popular-aggressive child benefits from broad adaptational resources unavailable to other aggressive children, the main hypothesis that guides this study is that popular-aggressive children will have had more time in child care than other children, including other aggressive children who are not popular. Bronfenbrenner (1979, p. 203) hypothesized that children who spent many hours in child care would be “more likely to engage in egocentric, aggressive, and antisocial behavior both during the preschool years and through later childhood into adolescence.” Early reports from the NICHD ECCRN confirmed a linkage between child care quantity and aggression in the SECCYD. When children were in child care at two and three years of age, child care quantity (as measured in mean hours per week since birth) was related to negative peer play as rated by caregivers but positive and skilled play as rated by observers (NICHD ECCRN, 2001). When children reached the kindergarten transition at age 4.5, child care hours were directly associated with externalizing problems, conflicts with adults, and aggression (NICHD ECCRN, 2003a). The association between child care hours and aggression appears to dissipate by grade 3 (Belsky et al., 2007; NICHD ECCRN, 2004a, 2005). Nonetheless, some features of child care within the SECCYD continue to show links to aggression into middle childhood (Belsky, 2009). As Bronfenbrenner (1979) predicted, children spending more hours in child care with small- and medium-sized peer groups continue to be rated as more aggressive by grade 3 teachers (NICHD ECCRN, 2008). Moreover, proportion of time in center-based care has been associated with increased aggression at grade 6 (Belsky et al., 2007) and lower awakening cortisol levels at age 15 (Roisman et al., 2009) in the SECCYD sample.

The construct of popularity might be able to clarify purported associations between child care quantity and later aggression. Some children with an extensive child care background might find that their early expressions of aggression have social value within the child care and beyond. Dmitrieva et al. (2007), using data from the Early Childhood Longitudinal Study, reported that kindergarteners manifested more externalizing problems by the end of the school year when they had many classmates with extensive child care histories. This effect of classroom composition was evident even for children who did not themselves attend child care. One interpretation of this finding is that some aggressive children with a history of extensive child care had sufficient popularity and status to influence their peers. Once a linkage between popularity and aggression is established, it may endure over similar peer ecologies with potential for broad social influence.

In this study, NICHD SECCYD participants were classified into popular-aggressive (“Tough”), popular-nonaggressive (“Model”), aggressive-nonpopular (“Aggressive”), and nonpopular-nonaggressive groups using teacher-ratings aggregated over grades 3–6 (see

Rodkin et al., 2000, 2006), and then validated through observational assessment. A variety of study measures enabled the determination of the unique developmental effects of early and concurrent cognitive functioning, early and concurrent maternal sensitivity, and early child care (i.e., quantity, quality, center-based care). The robustness of study findings was evaluated by using multiple criteria for popularity and by testing continuous popularity $\times$ aggression interactions over the entire sample.

Method

Participants

Families were recruited during hospital visits to mothers shortly after the birth of a child in 1991 at ten locations in the U.S. Recruitment and selection procedures are described in detail elsewhere (see <http://secc.rti.org>; NICHD ECCRN, 2003a). The NICHD SECCYD sample is diverse: 24% of mothers were minority, 11% of mothers had not completed high school, and 14% were single at the time of the infant's birth. Data for the current report are based on 1,022 children with any data on physically aggressive behavior (as assessed by the Teacher Report Form [TRF]; Achenbach, 1991; "hits others," "defiant," "mean," etc.) and teacher-rated popularity in grades 3, 4, 5, and 6. These grade school assessments were used due to continuity of measurement (identical measurement of aggression and popularity were available in these grades) and because prior studies of popular-aggressiveness have focused on this age range.

Identification of Groups

From the sub-sample of 1,022 participants, groups were identified based on a cross-classification of teacher-reported aggression and popularity in grades 3, 4, 5, and 6. The TRF aggression scale showed high internal consistency ($\alpha = .95$ at each assessment). In addition, because TRF reports across grades 3, 4, 5, and 6 scaled were strongly intercorrelated (mean $r = .54$, range from .50 to .59, all $ps < .001$), a mean TRF aggression score was computed to create groups ($\alpha = .82$). Teachers were asked to rank children's "popularity with the other same-sex children in your class" using a measure developed by the NICHD ECCRN, and computed at each grade as the sum of the total number of same-sex children plus one, minus study child popularity ranking (teachers ranked all same-sex children in the classroom from most to least popular), all divided by the total number of same-sex children. The range of scores computed in this manner is all positive numbers up to one. Again, because teacher-reported popularity in grades 3, 4, 5, and 6 were strongly intercorrelated (mean $r = .46$, range from .39 to .52, all $ps < .001$), scores were averaged ($\alpha = .78$) across time to create groups. Note finally that the mean TRF aggression and mean popularity variables were moderately negatively correlated ($r [1,022] = -.25, p < .001$).

Achenbach (1991) reports that a T-score of 60 can be used to define the clinical cut-point of TRF scales. In primary analyses, a cut-off for popularity was used that identified the top third. Using these criteria, four groups were identified as follows: *Nonpopular-nonaggressive* ($n = 467$; 240 males, 227 females)—scored below 60 on the TRF and below .66 on teacher-reported popularity; *Model* ($n = 418$: 199 males, 219 females)—scored below 60 on the TRF but at or above .66 on teacher-reported popularity; *Aggressive* ($n = 104$: 54 males, 50 females) scored at or above 60 on the TRF but below .66 on teacher-reported popularity; *Tough* ($n = 33$: 18 males, 15 females)—scored at or above 60 on the TRF and at or above .66 on teacher-reported popularity. Groups were also recomputed using a more stringent definition of popularity (top 20%; see Results); using these more conservative criteria nonpopular-nonaggressive, Model, Aggressive, and Tough groups contained 714, 171, 121, and 16 participants, respectively.

Participants in the analysis subsample ($n = 1,022$) differed from those excluded (i.e., the remaining members of the full SECCYD cohort; $N = 1,364$) in several ways, although effects were trivial to small. Children in the subsample had higher income-to-needs scores (in sample $M (SD) = 3.7 (2.8)$ vs. excluded = $3.2 (3.0)$, $t [1, 1,300] = 2.59$, $p < .01$), higher maternal education (in sample $M (SD) = 14.5 (2.4)$ vs. excluded = $13.6 (2.6)$, $t [1, 1,361] = 5.66$, $p < .001$), were less likely to be male (in sample = 50% vs. excluded = 57%, $X^2[1] = 4.64$, $p < .05$), and were less likely to be African American (in sample = 11% vs. excluded = 18%, $X^2[1] = 9.88$, $p < .01$).

Procedure

Mothers and children were visited at home and came to university laboratories multiple times from when the children were 1 month to grade 6. The teachers of participating children completed questionnaires about the children from school entry through grade 6. The study's Manuals of Operation (<http://secc.rti.org>) has additional details.

Measures

Demographic characteristics—Child *sex* and *maternal education* level were obtained by maternal report at 1 month. Family income was reported by mothers at each major data collection point and converted to an *income-to-needs ratio* by dividing total family income by the US Census-based poverty-level income for that family size. Ratios were averaged from data obtained at 6 through 54 months. Child *race/ethnicity* was coded as 1 = African American, 0 = all others, as previous research suggests that popular-aggressive children may be disproportionately African American (Luthar & McMahon, 1996; Rodkin et al., 2000).

Classroom observations of disruptiveness and social skills—Children's classroom experiences and behavior were observed several times over the course of the NICHD SECCYD. This analysis highlights 3rd and 5th grade assessments, which were concurrent with the identification of groups. Using the Classroom Observational Assessment for Third Grade (NICHD ECCRN, 2005) and Fifth Grade (NICHD ECCRN, 2004b), participants were observed for eight 44-minute cycles distributed across the school day. Among the 7-point ratings made by observers at each grade were *disruptiveness* and *social/cooperates with peers*. In addition to ensuring reliability by having coders rate a set of "gold standard" videos, "live" reliability was ascertained via a second coder. Inter-coder intraclass correlations were .87 and .85 for disruptiveness in 3rd and 5th grades, respectively, and .88 and .95 for social/cooperates with peers in 3rd and 5th grades. Because scores were significantly correlated in 3rd and 5th—grades and analyses conducted separately by assessment yielded an identical pattern of results—two across-time composites were created, standardized on the sub-sample under investigation: mean disruptiveness (3rd and 5th grade scores $r [753] = .18$, $p < .001$) and mean social/cooperates with peers (3rd and 5th grade scores $r [928] = .22$, $p < .001$).

Mother and teacher reports of social skills—Mothers completed the 38-item Social Skills Questionnaire from the Social Skills Rating System (SSRS; Gresham & Elliott, 1990) when children were in grades 3, 4, 5, and 6, indexing general social competence with adults and other children. All items that indexed social competence were summed to obtain a standardized measure of *total social skills* (as at the four assessments ranged from .88 to .91), and a composite was created by averaging scores in grades 3 through 6 ($\alpha = .92$). Similarly, teachers completed the 30-item school version of the SSRS (Gresham & Elliott, 1990) when children were in grades 3, 4, 5, and 6. A standardized *total social skills* scale was created by summing items indexing social competence (as at the four assessments ranged from .93 to .94), and a teacher-reported social skills composite was created by averaging scores in grades 3 through 6 ($\alpha = .77$).

Early cognitive functioning—Early cognitive functioning was assessed by standardizing and taking the mean of the total scores on the Bayley Mental Development Index at 15 and 24 months (Bayley, 1991), the Bracken Scale of Basic Concepts (School Readiness Scale; Bracken, 1984) at 36 months, and the Woodcock-Johnson Psycho-Educational Battery-Revised (WJ-R; Woodcock, 1990) at 54 months ($\alpha = .79$).

Later cognitive functioning—Cognitive functioning in grade school was assessed by standardizing and taking the mean of WJ-R (Woodcock, 1990) scores administered to participants in grades 1, 3, and 5. W (standard) scores for sub-scales at each time point were standardized and averaged (sub-scale reliability within time ranged from .84 to .94 in the sub-sample) before compositing across the three measurement occasions ($\alpha = .95$).

Early maternal sensitivity—Early maternal sensitivity was calculated from ratings of mothers' behavior during a videotaped interaction between mother and child under semi-structured, free-play conditions at 6, 15, 24, 36, and 54 months (detailed in NICHD ECCRN 1998 detailed in NICHD ECCRN 2002a detailed in NICHD ECCRN 2003a,b). The early maternal sensitivity score represents child-centered interactions that: reflect emotional support for the child that is responsive to the child's needs and warmly encouraging of the child's positive engagement with the toys and tasks in the interaction procedures (sensitivity to non-distress, supportive presence); is respectful of the child's interests and efforts (lack of intrusiveness, respect for autonomy); and is affectively positive (positive regard, lack of hostility). Internal consistency of the sensitivity composite ranged from $\alpha = .70$ to .84, and interrater reliabilities of the composites, calculated with intraclass correlations across raters, ranged from .83 to .87. Mean (standardized) sensitivity scores at 6, 15, 24, 36, and 54 months were used in analyses as a measure of *early sensitivity* ($\alpha = .76$).

Later maternal sensitivity—In grade 1, NICHD ECCRN staff videotaped an interaction between mother and child under semi-structured, free-play conditions. In grades 3 and 5, the context shifted to two tasks requiring participants to discuss areas of disagreement and to engage in a planning exercise. Sensitivity was computed as a composite of supportive presence, respect for autonomy, and hostility (reversed) at each assessment. Internal consistency of the sensitivity composite ranged from $\alpha = .80$ to .85, and interrater reliabilities of the composites, calculated with intraclass correlations across raters, ranged from .84 to .91. Mean (standardized) sensitivity scores in grades 1, 3, and 5 were used in analyses as a measure of *later sensitivity* ($\alpha = .71$).

Early child care—Child care information was obtained through phone calls with the mother and observations of the child's primary child care setting. Mothers were called every 3 months between the time the baby was 1 month and 36 months, and at 4 month intervals through 54 months, and asked to list the various places the child received care and the hours per week that the child spent in each arrangement. The *quantity* of care is the average hours per week from 1–54 months that the child spent in regular nonmaternal care; the amount of *center care* is expressed as the proportion of phone calls from 1–54 months in which the child was reported to be attending a child care center for at least 10 hr/week.

Quality of care was assessed via live observation of primary nonmaternal arrangements that were used for 10 or more hours per week at 6, 15, 24, 36, and 54 months, focusing on caregiver behaviors toward the study child. Observations were conducted during two half-day visits scheduled within a 2-week interval at 6, 15, 24, and 36 months and one half-day visit at 54 months. At each half-day visit, observers completed two 44-minute cycles of the Observational Record of the Caregiving Environment (ORCE) (NICHD ECCRN, 1996; 2002). Reliability exceeded .90 at 6 months, .86 at 15 months, .81 at 24 months, .80 at 36

months, and .90 at 54 months. The aggregated scores from 6, 15, 24, 36, and 54 months were standardized and averaged to form the *child care quality* composite.

Results

Analytic Plan

Planned comparisons, which are ideal in protecting against Type II error when *a priori* contrasts can be specified (e.g., they eliminate the need for omnibus *F*s; see Hays, 1988), were conducted in preliminary analyses. Each set of analyses contrasts the popular-aggressive (i.e., “Tough”) group with the other three groups (e.g., nonpopular-nonaggressive, Model, and Aggressive). In addition to *t*-statistics and their associated two-tailed *p*-values, standardized differences between means (Cohen’s *d*; effect sizes) were calculated. Note that (a) *ns* vary across analysis to maximize data available from each assessment (see Table 1, which presents *ns*, *Ms*, *SDs* for all dependent measures by group) and (b) because Levene’s test of homogeneity was significant for all planned comparisons except observed social skills, child care quantity, and child care quality, *ts* reported for all other planned comparisons do not assume equal variances across groups and *dfs* are estimates rounded to the nearest whole number.

Analyses are reported in five sets. First, the Tough group was externally validated by examining convergent evidence drawn from contemporaneous measures from grades 3 and 5. The question here was whether children in the Tough group are in fact simultaneously aggressive and socially effective—although not necessarily socially skilled based on adult standards. The second set of analyses examined whether two crucial developmental resources—adequate or better antecedent and contemporaneous parenting and cognitive functioning—served as explanatory factors in accounting for the presence of Tough children. The third set of analyses examined early child care experiences as an alternative explanation for Tough children’s co-occurring aggression and popularity.

The fourth set of analyses turns to the unique effects of predictors in aggregate using multinomial regression analysis with the Tough participants as the reference group. These analyses were conducted to examine which of the developmental resources (i.e., contemporaneous and antecedent cognitive functioning and sensitivity) and alternative explanatory factors (i.e., child care experiences) accounted for popular-aggressive status in grade school, even after controlling for background characteristics that might function as selection factors or confounds (i.e., demographic covariates; child sex, child African American vs. not, maternal education, and income-to-needs from 6–54 months). Fifth, to confirm that findings can not be attributed to the specific ways in which groups were created, robustness analyses considered whether: (a) groups constructed using a more conservative threshold for defining popularity (i.e., top 80% of class as compared to top third) yielded convergent evidence in follow-up multinomial regressions and (b) multinomial regression results could be replicated in a variable-based regression examining the predictive significance of the interaction of popularity and aggressiveness (controlling for main effects) over the entire analysis sample.

Contemporaneous Correlates

Observations of classroom behavior—Observers rated Tough children as significantly more disruptive during grades 3 and 5 than Model ($t [33] = 3.02, p < .01; d = .70$) and nonpopular-nonaggressive children ($t [33] = 2.91, p < .01; d = .66$), but not more disruptive than Aggressive children ($t [43] = .79, p = .43; d = .17$). Consistent with their status as popular, observers rated Tough children as significantly *more* socially skilled than

nonpopular-nonaggressive ($t [995] = 2.40, p < .05; d = .43$) and Aggressive children ($t [995] = 2.43, p < .05; d = .47$), and comparable to Model children ($t [995] = .38, p = .70; d = .07$).

Teacher- and mother-ratings of social skills—Teachers rated Tough children as significantly less socially skilled on the SSRS in grades 3 through 6 than Model ($t [36] = 11.89, p < .001; d = 2.24$) and nonpopular-nonaggressive children ($t [38] = 5.70, p < .001; d = .99$), although *more* socially skilled than Aggressive children ($t [53] = 2.58, p < .05; d = .52$). Mothers rated Tough children as significantly less socially skilled in grades 3 through 6 than Model ($t [33] = 3.79, p < .001; d = .78$) and nonpopular-nonaggressive children ($t [33] = 2.34, p < .05; d = .45$), and comparable to Aggressive children ($t [47] = 1.24, p = .22; d = .26$).

Developmental Resources

Cognitive functioning—Prior to grade school, Tough children had significantly lower levels of cognitive functioning than Model children ($t [35] = 2.84, p < .01; d = .54$), but were comparable to nonpopular-nonaggressive ($t [36] = 1.00, p = .32; d = .18$) and Aggressive children ($t [59] = 1.01, p = .32; d = .20$). Results in grade school were identical. Tough children had significantly lower levels of cognitive functioning than Model children ($t [33] = 2.31, p < .05; d = .49$), but were comparable to nonpopular-nonaggressive ($t [33] = 1.25, p = .22; d = .26$) and Aggressive children ($t [51] = .41, p = .69; d = .08$).

Maternal sensitivity—Prior to grade school, Tough children had significantly less sensitive mothers than Model ($t [35] = 3.53, p < .01; d = .70$) and nonpopular-nonaggressive children ($t [35] = 2.68, p < .05; d = .52$), but were comparable to Aggressive children ($t [54] = .38, p = .70; d = .08$). Results in grade school were identical. Tough children had significantly less sensitive mothers than Model ($t [33] = 3.69, p < .001; d = .77$) and nonpopular-nonaggressive children ($t [33] = 2.81, p < .01; d = .56$), but were comparable to Aggressive children ($t [47] = .24, p = .81; d = .05$).

Early Child Care Experiences

Groups were examined on three measures of child care measured through 54 months: hours per week in non-maternal child care (quantity), quality, and proportion of time in center-based care. Tough children spent significantly more time in non-maternal child care than Model ($t [1018] = 3.12, p < .01; d = .58$), nonpopular-nonaggressive ($t [1018] = 3.30, p < .001; d = .62$), and Aggressive children ($t [1018] = 3.16, p < .01; d = .68$). Tough children experienced significantly lower quality child care than did Model children ($t [919] = 2.13, p < .05; d = .41$), although the quality of their child care was comparable to nonpopular-nonaggressive ($t [919] = 1.39, p = .16; d = .26$) and Aggressive children ($t [919] = .02, p = .99; d = .004$). Tough children spent a marginally larger proportion of time in center-based care than Model ($t [35] = 1.70, p = .098; d = .32$) and nonpopular-nonaggressive children ($t [34] = 1.98, p = .06; d = .39$), but comparable time as Aggressive children ($t [45] = 1.24, p = .22; d = .26$).

Aggregate Effects of Predictor Variables

A multinomial regression predicting group was conducted with the Tough group as the reference category (see Table 2). We simultaneously entered four demographic covariates (child sex, maternal education, family income-to-needs, African American vs. not), the entire set of developmental resource variables (early and later cognitive functioning and maternal sensitivity) and the early child care variables (quantity, quality, and proportion of center-based care). The overall model fit the data well ($\chi^2[33, N = 898] = 127.36, p < .001$) and the Nagelkerke pseudo- R^2 was .15 (Details regarding likelihood ratio tests are available

from the authors). Three sets of parameter estimates are provided in Table 2 (nonpopular-nonaggressive vs. Tough; Model vs. Tough; and Aggressive vs. Tough). As can be seen, only two variables consistently distinguished the Tough children from each of the other groups. Specifically, net of other effects, Tough children were disproportionately African American and spent more hours per week in nonmaternal child care before they transitioned to grade school (i.e., through 54 months). In addition, a follow-up analysis examined whether the significant effect of child care quantity was moderated either by child care quality or center-based care exposure in a simplified multinomial regression in which the three main effects of early child care (quantity, quality, and center care) and the two relevant interaction effects (quantity $\times$ quality and quantity $\times$ center-based care) were entered. Neither interaction effect was significant, but the main effect of quantity continued to distinguish Tough children from other groups.

Robustness Analyses

To examine whether study findings were a product of the top 33% popularity criterion used in primary analyses, the multinomial regression of Table 2 was recomputed using a more stringent criterion that required “popular” participants to be in the top 20% in teacher-related popularity. As detailed in Table 3, the pattern of results was largely unchanged, suggesting that results are largely insensitive to the popularity criterion. Specifically, the model fit the data well ($\chi^2[33, N = 898] = 116.10, p < .001$) and the Nagelkerke pseudo- R^2 for the model was .15 (Details regarding likelihood ratio tests are available from the authors). Once again, only percent African American and early child care quantity consistently discriminated the Tough children from all other groups. Of note, however, African Americans were only marginally overrepresented in the Tough vs. Aggressive group in this analysis.

Two multiple regressions examined whether early child care and percent African American were associated with simultaneously high aggression and popularity levels in variable-based analyses. First, child care quantity was regressed onto mean aggression (grades 3–6), mean popularity (grades 3–6), and their interaction ($R^2 = .01, p < .01$). Results showed significant main effects of aggression ($\beta = .11, p < .01$) and popularity ($\beta = .07, p < .05$), as well as the expected significant interaction between popularity and aggression ($\beta = .07, p < .05$). The interaction is graphed in Figure 1 along Aiken and West’s (1991) guidelines (i.e., $\pm 1 SD$), and indicates that higher aggression and more child care are correlated only for more popular children. In contrast, a binary logistic regression examining whether the interaction of popularity and aggression was correlated with percent African American (Nagelkerke $R^2 = .18, p < .001$) yielded evidence only for a significant main effect of aggression ($e^B = 2.42, p < .001$; African American children were viewed by teachers as more aggressive), but not a main effect of popularity ($e^B = 1.17, p = .19$), or a significant aggression $\times$ popularity interaction ($e^B = 1.16, p = .11$).

Discussion

This study was conducted in order to learn more about a small but influential group of children who paradoxically are both very aggressive and very popular with their peers. The first study question was whether the social competencies that popular-aggressive (“Tough”) children enjoy are visible to objective observers, and to the mothers and teachers of these children. The second question we explored was whether the developmental resources of high cognitive functioning and maternal sensitivity distinguish Tough children from the majority of aggressive children who are not popular. The third question, and the primary focus of this study, was whether Tough children might have had a unique history of extensive participation in early child care through the age of 54 months. Research questions were addressed by making use of the public access data of the NICHD SECCYD through grade 6. The NICHD SECCYD allowed study analyses to take account of many features that are not

typical in studies of the popularity-aggression phenomenon, such as longitudinal data at regular intervals from infancy to grade 6, measures of popularity and aggression aggregated over four annual assessments from grades 3 to 6, classroom observations aggregated over grades 3 and 5, and information on potential covariates and multiple domains of developmental functioning. Study findings indicated one correlate that consistently distinguished Tough children from all other children: an extensive early history of nonmaternal child care.

The first study question addressed validity by asking whether children rated as popular and aggressive by teachers showed additional evidence of social competence. Can observers discern the social engagement that peer popularity entails, even when popularity is conjoined with aggression? Indeed, they can. Tough children were observed to be extremely disruptive yet highly sociable and cooperative with their peers. According to observers, Tough and “Model” (popular-nonaggressive) children had similar and high levels of social competence—and higher levels of social competence than nonpopular children. Do teachers and mothers recognize the social competencies of the popular-aggressive children in their midst? No, they do not. Mothers and teachers rated Tough children as having poorer social skills than Model and nonpopular-nonaggressive children. Thus, Tough children were viewed as socially skilled and aggressive by disinterested observers who focused on peer interaction quality, but as not socially skilled by adults who may have a frustrating history of trying to guide Tough children towards prosocial behavior.

The second study question asked whether Tough children enjoy developmental resources similar to Model children, and more resources than aggressive children who are not popular. Given the interpersonal skills of Tough children, might they have a history of high cognitive functioning? Might Tough children benefit from effective, sensitive parenting, in contrast to other aggressive children who suffer from hostile, inconsistent parenting? To both these questions, the answer appears to be no. Model children had higher levels of cognitive functioning and more sensitive parenting than Tough children, who were similar to aggressive-nonpopular children in these respects. Multinomial regressions did not show earlier or later cognitive functioning or maternal sensitivity to uniquely distinguish Tough children. Aggressive children had relatively low cognitive functioning and insensitive parenting irrespective of their popularity.

The third study question examined three features of children’s early child care: quantity, quality, and proportion of center-based care. Children who were popular and aggressive in middle childhood had an extensive history of early child care. From the period of 1–54 months of age, popular-aggressive children had an average of 31.8 hours per week of child care as compared to 23.6 hours for other children. Using a more stringent criterion for popularity (top 20% vs. top third), the effect of child care quantity increases to an average of 34.6 hours per week for popular-aggressive children and 23.7 hours per week for all other children, a difference of almost 11 hours per week. Multinomial regressions confirmed child care quantity differences to be significant when Tough children were contrasted with aggressive-nonpopular, popular-nonaggressive, and nonpopular-nonaggressive children net of other factors. Moreover, when popularity and aggression were treated continuously over the entire sample, there was a significant popularity $\times$ aggression interaction, such that more hours of early child care were associated with the combination of high popularity and high aggression in middle childhood.

Why might an extensive history of early child care distinguish popular-aggressive children from other children, including other aggressive children, over the grade school years? Three factors may be considered: the sometimes aggressogenic nature of early child care contexts,

the relation between the prevalence of aggression and its peer acceptance, and the enduring effects of aggression that has an actual or perceived base of social support.

Early childhood peer ecologies can sometimes appear to be conducive to the development of aggressive behavior. Children who spend a large part of their day in child care may be in the best position to learn how to employ aggression so as to garner social and material resources. Here, it is worth keeping in mind Luthar and McMahon's (1996, p. 601) conclusion that "what is valued or admired within the peer group is often diametrically opposed to what is viewed as positive adjustment from the standpoint of adults in conventional mainstream society." Luthar and McMahon (1996) were speaking of adolescents, but their comments hold true for early childhood as well. Aggressive, agonistic behavior can promote popularity, dominance, and status throughout the early childhood years (Estell et al., 2002; Hawley, 2002; Murphy, Murphy, & Newcomb, 1937; Pellegrini et al., 2007; Stormshak, Bierman, Bruschi, Dodge, Coie, & the Conduct Problems Prevention Research Group, 1999; Strayer, 1980; Vaughn et al., 2003).

There is reason to suspect that the early peer ecologies of SECCYD participants may sometimes have been aggressogenic, so that children with extensive child care may have had greater potential to conjoin aggressive behavior with peer (but not adult) perceived social competence. For example, NICHD ECCRN (2001) focused on relations between time in child care with other children and peer interaction skills at two and three years of age. Average weekly hours of care since birth was associated with negative peer play as rated by caregivers (e.g., teases, bullies others) and positive, skilled play as rated by observers (e.g., complex, reciprocal, frequent engagement). NICHD ECCRN (2001, p. 1493) questioned these results: "How could caregivers perceive and rate children as more negative, whereas observers rated the same children's actual interactions in the same setting as more positive?" The answer may be that children who spend well over 30 hours per week in child care have had time and opportunity to master a peer reward structure in which aggressors can become socially well-integrated, but nonetheless problematic for caregivers concerned with order and positive socialization.

The developmental question of whether child care-aggression linkages dissipate, endure, or spread might best be answered by reconsidering Bronfenbrenner's (1979) hypothesis that the relationship between child care quantity and later aggression is elicited and continually supported by peer-based social experiences (see also Belsky, 2009; Belsky et al., 2007; Dmetrieva et al., 2007; Fabes, Hanish, & Martin, 2003; Maccoby & Lewis, 2003). Although the main effect between child care quantity and later aggression in the SECCYD dissipates after kindergarten (NICHD ECCRN 2004a, 2005), it could be that the effect becomes concentrated towards child care arrangements with peers, such as: nonrelative care (NICHD ECCRN, 2005), center-based care (Belsky et al., 2007; NICHD ECCRN, 2005), and quantity of time in child care with small-and medium-sized peer groups (NICHD ECCRN, 2008). The present study suggests that a carrier of these peer group effects may be the popular-aggressive child, who has spent on average eight to 11 more hours a week in child care than other children over a four-and-one-half year period. By grade 6, these Tough children may have enduring patterns of peer aggression, possibly influencing other children toward antisocial behavior as well.

Of course, the mechanisms proposed here are speculative. Moreover, in some cases the child care-aggression association is null, or negative. For example, Côté et al. (2007) reported that nonmaternal child care *reduced* the risk of later aggression when care commenced before 9 months of age, but only for children with mothers with less than a high school education. Additionally, positive effects of high quality child care have been demonstrated within the

SECCYD and other samples, including more advanced linguistic functioning and higher mathematics and reading achievement (e.g., Dmetrieva et al., 2007; NICHD ECCRN 2005).

It is important also to emphasize that the effects found in this report are not exhaustive of all possible developmental antecedents of popular-aggressiveness. For example, Vaillancourt and Hymel (2006) suggest that popularity is associated not only with aggression (i.e., “explicit power”), but also with peer-valued characteristics (i.e., “implicit power”) such as being stylish, good looking, athletic, funny, tough, and wealthy (see also Adler & Adler, 1998; Sippola, Paget, & Buchanan, 2007). Athleticism, attractiveness, material resources, and related qualities are clearly important from early childhood to adolescence and beyond (Hawley, Johnson, Mize, & McNamara, 2007; Pellegini et al., 2007; Vaughn et al., 2003), but the NICHD SECCYD does not include many measures of the developmental resource of peer-valued characteristics.

Additionally, aggression and popularity measures drawn from the NICHD SECCYD were reliable, but were assessed in ways that are not typical in the peer relations literature. The focus of this report was on physical aggression as represented by the Achenbach (1981) TRF aggression scale. Along with not including many items on relational, social, or indirect aggression, the TRF aggression scale has limited capacity to detect gender differences because the scale is standardized by gender. Popularity was rated by teachers, as the NICHD SECCYD does not include peer nominations in middle childhood. Peer nominations represent a gold standard in the peer relations literature (but see Olweus, in press), but previous studies on popular-aggressiveness have used teacher-ratings (e.g., Rodkin et al., 2000), and there is generally strong concordance between teacher- and peer-representations of classroom social networks (Gest, 2006; Pearl, Leung, Van Acker, Farmer, & Rodkin, 2007). On a related note, a clear limitation of the present analysis is that the NICHD SECCYD does not include extensive measures of the peer social networks of early child care environments. Without this data, it remains speculative that children who are popular and aggressive in middle childhood are also central in early childhood peer ecologies (see also Linting & van IJzendoorn, 2009). Dynamic peer network data throughout the child care and grade school years would yield rich information in which social influence patterns could be developmentally mapped and modeled (Hanish & Rodkin, 2007).

Bronfenbrenner (1944, 1979), an early scholar of social status, warned that aggression could emerge as an adaptive short-term response for young children with extensive child care experiences (see also Belsky & Steinberg, 1978). The aggression discussed in pre-NICHD SECCYD reports of child care quantity corresponds with the kind of instrumental, proactive aggression typically associated with peer—status social skills (Haskins, 1985), “fearless aggressive nonconformity” (Moore, 1975, p. 257), and “independence rather than disturbed behavior” (Clarke-Stewart, 1989, p. 269). The aggression-as-adaptation perspective lost ground to deficit approaches once child care quantity failed to differentially predict externalizing subscales of the Achenbach (1991) at age 4.5 that theoretically ranged from “more adaptive” and less risky (i.e., assertiveness) to “less adaptive” and more risky (i.e., aggression, the same TRF subscale used in the present study over middle childhood) (NICHD ECCRN, 2003a, Table 9).

However, the adaptational significance of childhood aggression depends less on its form than on *who* is aggressing and the *context* in which aggression is elicited. This restatement of Wright, Giammarino, and Parad’s (1986) person-group similarity model (see also Chang, 2004; Stormshak et al., 1999) may hold true for many educational settings in America. Bronfenbrenner (1979) and Maccoby and Lewis (2003) stressed that quality child care could support socio-emotional development under certain conditions, including knowledgeable scaffolding for the peer ecologies of youth. Indeed, the prevalence of the popular-aggressive

child reminds us of the challenge that still awaits: to design educational systems in which children and adults share the same goals of learning and character, a challenge first pointed out by Coleman (1961) almost 50 years ago. As for the popular-aggressive children of the NICHD SECCYD, time will tell whether their social status can be transformed into social capital once high school is left behind, and the peer ecology of the school is replaced by new social challenges in emerging adulthood.

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Figure 1. Associations between early child care quantity (1–54 months) and the interaction of popularity and aggression (grades 3–6), computed over the entire analysis sample using Aiken and West’s (1991) guidelines (i.e., “High” = +1 SD; “Low” = –1 SD)

Table 1

Dependent measures by group

Variable	Nonpopular-Nonaggressive		Model		Aggressive		Tough	
	M (SD)	n	M (SD)	n	M (SD)	n	M (SD)	n
<i>Concurrent indicators</i>								
Obs. disruptiveness	-.09 (.87)	457	-.13 (.75)	413	+.65 (1.45)	100	+.96 (2.06)	33
Obs. social skills	-.21 (.97)	456	+.28 (.95)	410	-.26 (1.03)	100	+.21 (1.00)	33
T social skills	100 (9.6)	467	110 (8.1)	418	87 (8.8)	104	91 (8.9)	33
M social skills	106 (14.3)	463	111 (12.4)	413	96 (14.9)	103	100 (15.9)	31
<i>Developmental resources</i>								
Early cognition	-.09 (1.00)	459	+.24 (.90)	413	-.48 (1.12)	100	-.27 (.99)	32
Later cognition	-.05 (.96)	464	+.20 (.89)	415	-.45 (1.27)	104	-.34 (1.29)	32
Early sensitivity	+.01 (.96)	464	+.19 (.92)	417	-.63 (1.15)	102	-.54 (1.15)	33
Later sensitivity	-.00 (1.00)	463	+.19 (.88)	413	-.56 (1.12)	102	-.62 (1.19)	31
<i>Early child care experiences</i>								
Hours/week in CC	23.5 (14.0)	467	23.9 (14.1)	418	23.0 (12.9)	104	31.8 (12.8)	33
Quality of CC	-.02 (1.01)	423	+.11 (.98)	374	-.27 (1.01)	93	-.27 (.88)	33
% Center-Care	.20 (.24)	451	.21 (.27)	411	.23 (.24)	99	.30 (.29)	32

Note. Mean values reported for all observational measures are z-scores standardized on the sub-sample classified into one of the groups. Groups were defined using a 66% cutoff for popularity and $T \geq 60$ cut-off for defining significantly elevated levels of aggression. Obs = Observed; T = Teacher; M = Mother; CC = Child Care.

Table 2
Parameter estimates for multinomial logistic regression predicting popular-aggressive groups

Variable	B	SE	Wald	df	p	e^B
<i>Nonpopular-nonaggressive v. Tough</i>						
Intercept	3.03	1.67	3.29	1	.07	
Sex	.21	.41	.26	1	.61	1.23
Maternal Education	-.06	.11	.24	1	.62	.95
Income-to-Needs	.06	.12	.23	1	.63	1.06
African American?	-2.43	.53	20.69	1	<.001	.09
Early Cognitive Functioning	-.52	.31	2.86	1	.091	.60
Later Cognitive Functioning	.10	.28	.14	1	.71	1.11
Early Sensitivity	.25	.26	.91	1	.34	1.28
Later Sensitivity	.22	.23	.92	1	.34	1.24
Hours/week in CC	-.05	.02	5.49	1	<.05	.96
Quality of CC	-.11	.21	.26	1	.61	.90
% Center-Care	-.71	.75	.88	1	.35	.49
<i>Model v. Tough</i>						
Intercept	4.08	1.67	5.97	1	<.05	
Sex	.24	.41	.34	1	.56	1.27
Maternal Education	-.11	.12	.90	1	.34	.90
Income-to-Needs	.09	.12	.60	1	.44	1.09
African American?	-1.69	.53	10.06	1	<.01	.18
Early Cognitive Functioning	-.16	.31	.25	1	.61	.86
Later Cognitive Functioning	.23	.28	.68	1	.41	1.26
Early Sensitivity	.26	.26	1.01	1	.32	1.30
Later Sensitivity	.31	.23	1.86	1	.17	1.37
Hours/week in CC	-.04	.02	4.94	1	<.05	.96
Quality of CC	-.06	.22	.07	1	.80	.95
% Center-Care	-.62	.76	.68	1	.41	.54
<i>Aggressive v. Tough</i>						
Intercept	2.56	1.82	1.99	1	.16	
Sex	.17	.45	.15	1	.70	1.19

Variable	B	SE	Wald	df	p	e ^B
Maternal Education	-.09	.13	.49	1	.49	.92
Income-to-Needs	.02	.13	.02	1	.89	1.02
African American?	-1.65	.58	8.21	1	<.01	.19
Early Cognitive Functioning	-.39	.34	1.33	1	.25	.68
Later Cognitive Functioning	.04	.30	.02	1	.88	1.05
Early Sensitivity	-.02	.28	.01	1	.95	.98
Later Sensitivity	-.01	.25	.00	1	.97	.99
Hours/week in CC	-.05	.02	6.08	1	<.05	.95
Quality of CC	-.15	.23	.41	1	.52	.84
% Center-Care	.06	.84	.01	1	.95	1.06

Note. For this analysis, $n = 30$ for Tough, $n = 414$ for nonpopular-nonaggressive, $n = 365$ for Model, and $n = 89$ for Aggressive. Groups were defined using a 66% cutoff for popularity. Positive B s indicate that the group scored higher on the variable in question compared to the reference group (popular-aggressive) net of other variables. For sex, 1=Male, 0=Female. For African American, 1=African American, 0=Not African American. CC = Child Care.

Table 3
Parameter estimates for multinomial logistic regression predicting popular-aggressive groups

Variable	B	SE	Wald	df	p	e ^B
<i>Nonpopular-nonaggressive v. Tough</i>						
Intercept	4.33	2.42	3.20	1	.07	
Sex	.18	.59	.11	1	.76	1.20
Maternal Education	.01	.16	.00	1	.97	1.01
Income-to-Needs	-.05	.14	.16	1	.69	.95
African American?	-2.30	.77	8.85	1	<.01	.10
Early Cognitive Functioning	-.73	.45	2.62	1	.11	.48
Later Cognitive Functioning	-.48	.42	1.32	1	.25	.62
Early Sensitivity	.72	.37	3.85	1	.05	2.06
Later Sensitivity	.03	.34	.01	1	.92	1.03
Hours/week in CC	-.07	.03	5.88	1	<.05	.93
Quality of CC	.10	.30	.11	1	.75	1.10
% Center-Care	1.38	1.22	1.27	1	.26	3.97
<i>Model v. Tough</i>						
Intercept	3.76	2.50	2.27	1	.13	
Sex	.06	.61	.01	1	.92	1.06
Maternal Education	-.06	.16	.13	1	.72	.94
Income-to-Needs	-.01	.14	.01	1	.92	.99
African American?	-1.99	.84	5.65	1	<.05	.14
Early Cognitive Functioning	-.44	.46	.89	1	.34	.65
Later Cognitive Functioning	-.44	.43	1.05	1	.31	.64
Early Sensitivity	.86	.39	4.98	1	<.05	2.37
Later Sensitivity	.14	.35	.15	1	.70	1.15
Hours/week in CC	-.07	.03	5.03	1	<.05	.94
Quality of CC	.21	.31	.47	1	.49	1.24
% Center-Care	1.12	1.26	.79	1	.38	3.05
<i>Aggressive v. Tough</i>						
Intercept	3.10	2.53	1.50	1	.22	
Sex	.10	.62	.03	1	.88	1.10

Variable	B	SE	Wald	df	p	e ^B
Maternal Education	.01	.17	.00	1	.97	1.01
Income-to-Needs	-.12	.15	.65	1	.42	.89
African American?	-1.51	.80	3.53	1	.06	.22
Early Cognitive Functioning	-.69	.47	2.14	1	.14	.50
Later Cognitive Functioning	-.65	.43	2.32	1	.14	.52
Early Sensitivity	.54	.39	1.99	1	.16	1.72
Later Sensitivity	-.25	.35	.51	1	.48	.78
Hours/week in CC	-.07	.03	6.08	1	<.05	.93
Quality of CC	.09	.31	.08	1	.78	1.09
% Center-Care	2.34	1.28	3.35	1	.07	10.39

Note. For this analysis, $n = 14$ for Tough, $n = 627$ for nonpopular-nonaggressive, $n = 152$ for Model, and $n = 105$ for Aggressive. Groups were defined using an 80% cutoff for popularity. Positive B s indicate that the group scored higher on the variable in question compared to the reference group (popular-aggressive) net of other variables. For sex, 1=Male, 0=Female. For African American, 1=African American, 0=Not African American. CC = Child Care.