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The Reactive–Proactive Aggression Questionnaire: Differential Correlates of Reactive and Proactive Aggression in Adolescent Boys

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Abstract

This study reports the development of the Reactive–Proactive Aggression Questionnaire (RPQ), and the differential correlates of these two forms of aggression. Antisocial, psychosocial and personality measures were obtained at ages 7 and 16 years in schoolboys, while the RPQ was administered to 334 of the boys at age 16 years. Confirmatory factor analysis indicated a significant fit for a two-factor proactive–reactive model that replicated from one independent subsample to another. Proactive aggression was uniquely characterized at age 7 by initiation of fights, strong-arm tactics, delinquency, poor school motivation, poor peer relationships, single-parent status, psychosocial adversity, substance-abusing parents, and hyperactivity, and at age 16 by a psychopathic personality, blunted affect, delinquency, and serious violent offending. Reactive aggression was uniquely characterized at age 16 by impulsivity, hostility, social anxiety, lack of close friends, unusual perceptual experiences, and ideas of reference. Findings confirm and extend the differential correlates of proactive–reactive aggression, and demonstrate that this brief but reliable and valid self-report instrument can be used to assess proactive and reactive aggression in child and adolescent samples.

Keywords

proactive; reactive; aggression; psychopathy; schizotypal; questionnaire

INTRODUCTION

Understanding the causes of adolescent aggression is becoming an increasingly important research topic, yet one of the major criticisms of such research is that too little attention is paid to the heterogeneity of this construct. The distinction between proactive and reactive aggression represents one potentially important perspective that promises to shed light on different

etiological pathways to aggression [Crick and Dodge, 1996; Dodge, 1991], but an important gap in the literature is the lack of time-efficient, self-report measures of these constructs. The development of teacher rating scales to assess these two constructs in children has stimulated research on their differential etiology [Brown et al., 1996; Dodge and Coie, 1987; Vitiello et al., 1990]. Yet, while there are numerous self-report measures of aggression for adults [Lilienfeld et al., 1997], very few have been developed for child and adolescent populations [Little et al., 2003]. Self-report measures of proactive–reactive aggression would have a potentially important advantage over more objective teacher rating or observational measures. Intrinsic motivation for the aggressive act forms a key distinction between proactive and reactive aggression. The motivation for action is often obscure to the observer, yet very salient to the initiator (e.g. the proactive “had fights to show who was on top” and the reactive “damaged things because you felt mad”). To address this gap, this paper reports the development of a self-report scale of proactive–reactive aggression in adolescents and explores the differential correlates of these two forms of aggression.

Proactive aggression in the human and animal literature has been characterized as instrumental, organized, and “cold-blooded”, with little evidence of autonomic arousal [Dodge, 1991; Meloy, 1988; Mirsky and Siegel, 1994]. Psychopaths, who have been characterized as manipulative, parasitic, autonomically under-aroused, stimulation seeking, and emotionally blunted [Hare et al., 1999; Newman, 1997; Patrick and Zempolich, 1998] have higher rates of violent crimes than non-psychopaths [Hare and McPherson, 1984]. More directly, at least two studies have shown that criminals identified as perpetrating predominantly instrumental (proactive) violent offenses have higher scores on the Psychopathy Checklist than those with a history of reactive violence [Cornell et al., 1996; Dempster et al., 1996]. Patrick [2001] has also argued that “true” psychopathy is more associated with proactive rather than reactive aggression, while at the child level, Frick et al. [2003] found that psychopathic-like children with callous-unemotional traits have higher proactive aggression scores. For these reasons, it was predicted that proactive, but not reactive, aggression would be characterized by higher levels of psychopathic personality, blunted affect, and stimulation-seeking tendencies.

The psychopathy perspective on proactive aggression gives rise to further predictions on this subtype of aggression. Defining features of psychopathy include childhood conduct problems, juvenile delinquency, and chronic criminal behavior in adulthood [Forth, 1995; Hare et al., 1999]. Consistent with the notion of a link between psychopathy and proactive aggression in particular, proactive but not reactive aggression predisposes to criminality [Pulkkinen, 1996] and is associated with delinquency and disruptive behavior problems [Atkins and Stoff, 1993; Vitaro et al., 1998]. Consequently, it was predicted that proactive, but not reactive, aggression would be most strongly associated with delinquency, perpetration of serious and violent criminal acts, initiation of fights, and the use of strong-arm tactics in childhood.

While psychopaths have superficial charm, in the long run they have superficial and poor interpersonal relations. In turn, while proactively aggressive children can be popular with classmates and have a sense of humor [Dodge and Coie, 1987], over time this behavior is associated with a decrease in the quality of peer relationships [Poulin and Boivin, 1999]. Furthermore, proactively aggressive children tend to have negative peer social status [Brown et al., 1996], and were the most bothersome and disruptive group in the study by Dodge and Coie [1987]. On this basis, it was predicted that proactive aggression would be associated with poor peer relations. Similarly, psychopaths are more likely to have substance-abusing fathers [Koivisto and Haapasalo, 1996], and proactively, but not reactively, aggressive individuals have been found to abuse alcohol and drugs in adulthood [Pulkkinen, 1996; Vitiello et al., 1990]. Psychopaths as a group have also been found to be characterized by social adversity [Ishikawa et al., 2001; Marshall and Cooke, 1999]. It was therefore predicted that proactive,

but not reactive, aggressive adolescents would have substance-abusing parents who are low in education and occupation.

The psychopathy perspective on proactive aggression in children would make the prediction that proactively aggressive children would be characterized by hyperactivity. Lynam [1996, 1998] has argued that children with both hyperactivity-impulsivity-attention (HIA) and conduct disorder are at later risk for psychopathy. Theoretically, if HIA is indeed a predisposition to psychopathy, and if proactive aggression is a forerunner to psychopathy, it would be predicted that proactively aggressive children would show some evidence of HIA at age 7 and attention problems at age 16.

In contrast to proactive aggression, Dodge and colleagues have shown that reactively aggressive children tend to have information-processing deficits [Crick and Dodge, 1996; Dodge and Coie, 1987], while Giancola et al. [1996] found that executive function deficits predicted reactive aggression in boys at risk for substance abuse. Such social and executive function deficits may have a foundation in the symptoms of unusual perceptual experiences, ideas of reference, and paranoid ideation which make up the cognitive-perceptual features of schizotypal personality, features that can also be viewed as errors in encoding social cues [Raine et al., 1994]. In adults, heightened and diffuse sensory awareness, loss of reality testing, ideational, and delusional thinking represent four core traits of reactive aggression [Meloy, 1988], traits that also characterize many individuals with schizotypal personality disorder. Based on evidence that reactively aggressive children are more likely to have personality disorders in adolescence [Dodge et al., 1997] and schizophrenia in adulthood [Vitiello et al., 1990], we tested the hypothesis that reactive aggression is associated with schizotypal personality, particularly schizotypal symptoms that are most closely aligned to information-processing deficits (ideas of reference, unusual perceptual experiences, magical thinking, and paranoid ideation).

Although psychopathy and schizotypy perspectives on proactive and reactive aggression, respectively, provide the basis for most hypotheses in the current study, other perspectives make predictions on the differential correlates of proactive and reactive aggression. Reactive aggression has been conceptualized as a fear-induced, irritable, and hostile affect-laden defensive response to provocation [Dodge, 1991; Meloy, 1988; Volavka, 1995] and involves a lack of inhibitory functions, reduced self-control, and increased impulsivity [Atkins et al, 1993; Raine et al., 1998]. These perspectives would predict that reactive aggression would be associated with an impulsive personality, and with higher scores on hostile aggression. Because reactively aggressive individuals are hypothesized to be hypervigilant to stimuli that could be perceived as threatening, it would also be predicted that they have higher levels of social anxiety in contrast to proactively aggressive adolescents who are viewed as lacking in affect and emotional depth.

METHODS

In overview, the Reactive-Proactive Aggression Questionnaire (RPQ) was administered at age 16 years to a subsample of 503 schoolboys originally assessed at age 7 years. Psychosocial and behavioral measures, originally collected at age 7, were used to establish criterion validity of the questionnaire, while additional personality and behavior rating data were collected at age 16 to establish construct, convergent, and discriminant validity.

Participants

Participants in this two-wave study consisted of 335 of the youngest of the three samples making up the Pittsburgh Youth Study. The 335 participants had a mean age of 16.15 years at the time of testing (SD = 0.89), with 41.2% Caucasian and 58.8% African-American. Full

details of background characteristics and initial subject recruitment in 1987–1988 when children (all male) were aged 7 years are given in Loeber et al. [1998]. Briefly, 868 boys from grade 1 were assessed by caretakers, teachers, and the boys themselves on 21 serious antisocial behaviors. The 250 most antisocial boys were selected for further study, together with 253 boys randomly selected from the remainder, to make a total sample of 503.

Of the original sample of 503, 335 (66.6%) participated in a substudy on the biosocial bases of aggressive and violent behavior and which included assessment of proactive and reactive aggression. The 10-year attrition of 168 (33.4%) for the substudy broke down as follows: 31 living out of the area, 20 in jail, 45 refused larger Pittsburgh Youth Study, 35 refused the biosocial study, 27 repeatedly cancelled appointments, and 10 failing to decide on participation. Participants were compared with non-participants on initial data collected at age 7 to assess for bias. Odds ratios, confidence intervals (CI), and statistical significance were computed as follows: socioeconomic status (odds ratio = 0.99, CI = 0.65–1.49, $P = .94$), ethnicity (African-American vs. White: 1.15, 0.79–1.67, $P = .46$), initial risk status (1.09, 0.75–1.58, $P = .64$), delinquency seriousness (no or minor delinquency vs. moderate or serious delinquency: 0.83, 0.55–1.25, $P = .37$) and violence seriousness (no violence vs. gang fighting and attacks: 0.87, 0.56–1.36, $P = .55$). As all odds ratios were non-significant, there was no evidence of selective attrition.

Construction of the Reactive–Proactive Aggression Questionnaire

Items to measure proactive and reactive aggression were generated by A.R. and K.D. Items were generated based on (a) the items contained in teacher-rating measures of proactive–reactive aggression [Dodge and Coie, 1987; Brown et al., 1996] and (b) the conceptual and theoretical literature on proactive and reactive aggression [Barratt, 1991; Dodge and Coie, 1987; Meloy, 1988; Vitiello et al., 1990].

In addition to their conceptual relevance to proactive or reactive aggression, items had to reflect either physical or verbal aggression, and an effort was made to include the motivation and situational context for the aggression (e.g. “Had fights with others to show who was on top”, “Gotten angry when others threatened you”). Questions were kept grammatically simple and written at 3rd grade reading level so that questions could be read by most 8-year-olds and adolescents with limited reading ability. The aggression content of the items was kept broad in order to be appropriate to a wide age-range and to be not too infrequent. Instructions were kept simple, and in order to help facilitate a non-defensive response style, the questionnaire started with the acknowledgment that most people feel angry at times. Each item was rated as 0 (never), 1 (sometimes), or 2 (often) for frequency of occurrence.

In the original questionnaire of 26 items, an equal number of reactive (13) and proactive (13) items alternated in order. Initial reliability analyses led to the deletion of three items prior to confirmatory factor analysis. One proactive and one reactive item each had an endorsement frequency falling below 10% (2.4% and 6.3% respectively) and item-total correlations were below 0.20 (.12 and .18). A third (reactive) item (“damaged things because you felt angry”) had been mistakenly included, replicating almost completely another question (“damaged things because you felt mad”). The latter version of this question was retained over the former owing to its slightly higher item-total correlation and endorsement frequency. These item deletions resulted in a final questionnaire with 23 items (12 proactive, 11 reactive). Full responses were obtained from 334 of the 335 boys. The final 23-item version of the questionnaire takes approximately 3 min to complete, and is reproduced in Appendix A.

Residualized Proactive and Reactive Measures

Consistent with past studies that have observed significant proactive–reactive intercorrelations of 0.76 [Dodge and Coie, 1987], 0.67 [Brown et al., 1996], 0.47 [Poulin et al., 1997], and 0.41 [Day et al., 1992], the raw mean proactive aggression score was significantly correlated with the raw mean reactive aggression score ($r = .67$, $N = 334$, $P < .0001$). In addition to raw proactive, reactive, and total aggression scores, residualized measures of proactive and reactive aggression were created in order to help assess the correlates of “pure” proactive aggression independent of reactive aggression, and of “pure” reactive aggression independent of proactive aggression. Reactive aggression was regressed on proactive scores and Pearson standardized residuals (with a mean of 0 and SD of 1) were saved to index purely proactive aggression, while the standardized residuals of proactive aggression on reactive aggression were saved to index purely reactive aggression.

Concurrent Measures (Age 16 Years)

In addition to administration of the RPQ, measures of hostility, impulsivity, sensation seeking, anxiety, and schizotypal personality were all measured at age 16 from the boy. Measures of externalizing and internalizing disorder and psychopathy were obtained from the mother at this age, while delinquency was assessed based on ratings from the parent, the teacher, and the subject at age 16.

Child Behavior Checklist—An extended version of the Child Behavior Checklist (CBCL) [Achenbach, 1978] was completed by the participant’s mother.

Delinquency seriousness classification groups—Subjects were classified into six levels of delinquency seriousness based on an extension of a four-stage delinquency seriousness classification (see Loeber et al. [1998] for full details). Briefly, subjects were given the Self-Report Delinquency form at age 16 [Elliot et al., 1985]. In addition, parents and teachers completed their respective report forms of the CBCL at age 16. Categories were constructed to represent none, minor (at home), minor (other), moderate, serious delinquency and serious violent delinquency.

Childhood Psychopathy Scale [Lynam, 1997]—The CPS was completed by the mothers of the boys. This instrument is a minor revision of a previous version [Lynam, 1997] designed to operationalize, in childhood and adolescence, the traits found in the Revised Psychopathy Checklist [Hare, 1991]. The internal consistencies of these two- to six-item scales (mode equals three items) range from .45 to .75. The internal reliability of the total scale is 0.92, while validity data are presented in Lynam [1997].

Sensation seeking, impulsivity, and hostility-aggression—These three self-report personality dimensions were assessed using the Zuckerman–Kuhlman Personality Questionnaire [Zuckerman et al., 1993]. As suggested by Zuckerman et al. [1993, p 46], the items making up the Impulsivity Stimulation Seeking Subscale were subdivided to form separate measures of sensation-seeking and impulsivity.

Trait anxiety—The Trait Anxiety Scale [Spielberger et al., 1970] was completed by the boy.

Schizotypal Personality Questionnaire—The Schizotypal Personality Questionnaire (SPQ) [Raine, 1991] is a self-report questionnaire modeled on DSM criteria for schizotypal personality disorder and assesses nine features of schizotypal personality. Three main factors of the instrument consist of cognitive–perceptual deficits, interpersonal deficits, and disorganization [Raine et al., 1994]. Reliability and validity data for the SPQ are provided in Raine [1991].

Prospective Antisocial and Psychosocial Measures at Age 7 Years

At age 7 after initial entry into the study, interviews were conducted with both the boy and his main caretaker, while a questionnaire was also completed by the teacher. Full methodological details for these measures are provided in Loeber et al. [1998] and consisted of the following: *Strong-arm tactics*: a dichotomized measure of participation in violent strong-arm tactics based on several questions to parents, teachers, and the child regarding participation in strong-arm tactics (defined as robbery, $N = 25$). *Initiates fights*: a yes/no dichotomy based on caretaker and teacher reports of whether the child “starts physical fights over nothing” ($N = 144$). *Fighting a lot*: coded yes/no based on caretaker and teacher reports of whether the child “gets into many fights” ($N = 200$). *Hyperactivity-impulsivity-attention problems (HIA)*: a scale based on 50 items rated by parents and teachers reflecting 14 behaviors of hyperactivity, attention deficits, and impulsivity (coefficient $\alpha = 0.82$); *Peer relationships*: a three-point scale from teachers on how well the boy typically gets along with his peers. The 25% of boys rated as having the worst problems ($N = 71$) were classified as having poor peer relationships; *Parents condoning their child’s antisocial behavior*: a scale based on 18 questions to parents about their attitude toward their son’s antisocial behavior (coefficient $\alpha = 0.58$). The variable was divided into quartiles and the group in the highest quartile defined as relatively tolerant of their child’s antisocial behavior. *Single-parent status*: a dichotomous measure based on boys alone with their mother versus boys at home with both parents. *Father poorly educated*: defined from caretaker reports as those who had not reached grade 12 ($N = 32$). *Father unemployed*: defined as unemployment longer than 21 weeks in the previous year ($N = 32$). *Low social class*: was computed using the Hollingshead [1975] index. Those in the lowest quartile (27 or lower) were considered as low in social class ($N = 93$). *Few shared activities*: a scale based on parent and child reports on the amount of time the parent spent with the boy over the previous six month period ($\alpha = .68$). Those in the lowest quartile ($N = 96$) were categorized as “less involved in shared family activities”. *Parental substance abuse*: based on caretaker reports of substance abuse problems in either the mother or father ($N = 89$). *Poor school motivation*: teacher reports based on a seven-point scale and dichotomized into the lowest 20% on school motivation ($N = 68$).

Confirmatory Factor Analysis Procedures

The raw scores final set of 23 items (12 reactive and 11 proactive) was subjected to confirmatory factor analysis. Confirmatory factor analysis was conducted using EQS 6 [Bentler, 2002]. Owing to significant kurtosis (Mardia’s normalized multivariate kurtosis was greater than 3), robust methods using robust standard errors were applied to correlation structures. Two models based on prior research were evaluated: a one-factor model (general aggression) and a two-factor model (proactive and reactive aggression). To provide a baseline comparison for these two models, the null model was also fitted. Under this model, each of the items is assumed to represent completely independent and uncorrelated dimensions of aggression.

Six commonly used goodness-of-fit indices were reported to assess the fit of the following models: chi-square, the Akaike information criterion (AIC) [Akaike, 1987], the root mean squared error of approximation (RMSEA) index [see McDonald, 1989], the comparative fit index (CFI) [Bentler, 1990]; the non-normed fit index [Bentler and Bonett, 1980], and the incremental fit index [Bollen, 1989]. Direct comparisons were made between the one and two-factor models that are in hierarchical relationship (i.e. nested) using the difference chi-square ($\Delta\chi^2$) test [Loehlin, 1992], with the one-factor model nested within the two-factor model. The total sample of 334 was randomly split into two equal independent subsamples in order to test replicability of findings.

RESULTS

Confirmatory Factor Analysis

We find replicable evidence for a two-factor (reactive–proactive) structure to the RPQ. The two-factor model (reactive–proactive) was compared with a one-factor model (general aggression) and the null model. Goodness-of-fit indices for these models together with factor loadings are presented for each of the two replication samples and the total sample in Table I. In all samples, the two-factor and one-factor models fitted better than the null model. Furthermore, the two-factor model fitted the data significantly better than the one-factor model. For sample 1, a chi-square difference test indicated a highly significant better fit for the two-factor model (reactive–proactive) over the one-factor model ($\Delta\chi^2 = 65.0$, $df = 1$, $P < .0001$). This finding was replicated in sample 2, ($\Delta\chi^2 = 62.0$, $df = 1$, $P < .0001$) and was also true for the total sample ($\Delta\chi^2 = 287.0$, $df = 1$, $P < .0001$). In all samples, RMSEA was below .05, indicating a very good fit. Similarly, chi-square values were less than twice the degrees of freedom, indicating a good fit [Bentler and Dudgeon, 1996]. For the total sample, fit indices were above .90, while RMSEA was below .05, indicating a very good fit. AIC values also indicated that the two-factor model was the better-fitting model in all samples. The CFI indicated that 91% of the covariation in the data is reproduced by the two-factor model. All individual items loaded .40 or greater on each of their respective factors in all samples (see Table I).

Internal Reliability and Mean Scores

Means, SDs, and internal reliabilities for the scales (raw scores) are provided in Table II for the two subsamples and the total sample. Item-total correlations ranged from .41 to .57 for the proactive scale, .45 to .58 for the reactive scale, and .41 to .60 for the total scale. All three scales have internal reliabilities in excess of 0.83 (see Table II). Proactive aggression was less prevalent than reactive aggression, with proactive scores being considerably lower than reactive scores (paired $t = 24.6$, $df = 333$, $P < .0001$, $d = 1.35$). As would be expected from randomly produced samples, samples 1 and 2 did not differ significantly on scale scores ($P > .23$).

Construct Validity

Four forms of validity of the RPQ were assessed. Construct validity of the RPQ was assessed by relating both raw and residualized proactive and reactive scales to age 16 measures of self-report personality (psychopathy, schizotypy, impulsivity, stimulation-seeking, anxiety) and age 7 hyperactivity and social and family measures. Convergent validity was assessed by examining the relationship between the RPQ and both age 16 self-report and parent-rated (CBCL) aggression scores. Criterion validity was assessed in relation to age 7 aggression measures as well as age 16 delinquency/violence classification. Finally, discriminant validity was assessed in relation to age 16 CBCL scales conceptually unrelated to aggression (withdrawal, somatic complaints, thought problems, and social problems).

Schizotypy—Positive and significant relationships were observed between raw proactive, reactive, and total aggression scores and the SPQ scales at age 16 (see Table III, upper half). However, residualized scores showed differential patterns of relationships. Only the proactive scale was associated with blunted affect, while only the reactive scale was associated with unusual perceptual experiences, ideas of reference, social anxiety, no close friends, and odd speech. Paranoid ideation was the one schizotypal feature common to both residualized forms of aggression.

Psychopathy, personality, and hyperactivity-impulsivity-attention

Psychopathy—All raw age 16 aggression measures were positively and significantly associated with mothers' age 16 ratings of psychopathy (see Table III, lower half). On the other hand, the proactive, but not reactive, residualized scores were significantly associated with psychopathy.

Impulsivity—All raw aggression measures (age 16) were significantly and positively associated with age 16 impulsivity scores on the Zuckerman Impulsivity Personality Scale, but only the residualized reactive aggression measure was significantly correlated with impulsivity (see Table III).

Stimulation seeking—All raw aggression measures (age 16) were positively and significantly correlated with age 16 stimulation seeking (see Table III). Furthermore, residualized measures of both proactive and reactive aggression were significantly associated with stimulation seeking.

Anxiety—Both raw and residualized reactive, but not proactive, aggression scores (age 16) were significantly and positively associated with the age 16 Trait Anxiety Scale (see Table III).

Hyperactivity-impulsivity-attention problems—Those rated as having HIA at age 7 had significantly higher scores on both raw proactive ($t = 2.38, P = .018$) and residualized proactive ($t = 2.39, P = .018$), but not reactive, aggression scores at age 16.

Child Behavior Checklist attention problems—Raw proactive (but not reactive) and total aggression scores (age 16) were positively and significantly related to mothers' ratings of attention problems on the CBCL at age 16 years (see end of Table IV).

Psychosocial and family measures

Poor peer relationships—Boys with poor peer relationships at age 7 scored significantly higher on raw proactive aggression ($t = 2.77, P = .006$), raw total aggression ($t = 2.44, P = .015$), and residualized proactive aggression ($t = 2.05, P = .041$) at age 16. They also showed a trend to higher raw reactive aggression scores ($t = 1.76, P = .08$), but there was no significant effect for residualized reactive scores ($t = 0.01, P = .99$).

Parents condone antisocial behavior—There was a trend ($t = 1.84, P = .07$) for boys who had parents condoning their antisocial behavior at age 7 to have higher raw proactive (but not reactive) scores at age 16.

School motivation—Boys who were poorly motivated in school at age 7 had higher raw proactive ($t = 2.11, P = .036$) and residualized proactive (but not reactive) aggression scores ($t = 2.39, P = .017$) at age 16.

Father's education—Boys with poorly educated fathers at age 7 had significantly higher raw and residualized proactive (but not reactive) scores at age 16 ($t = 2.32, P = .022$).

Father unemployed—Boys with unemployed fathers at age 7 had higher raw and residualized proactive (but not reactive) raw ($t = 2.81, P = .006$) and residualized ($t = 2.38, P = .018$) total aggression scores at age 16.

Low social class—Boys from low SES families at age 7 had significantly higher raw ($t = 2.75, P = .006$) and residualized proactive ($t = 2.59, P = .018$), but not reactive, scores at age 16 years.

Few shared activities—There was no significant association between aggression scores and participation in few shared activities at age 7 years for any measure ($P > .55$).

Parental substance abuse—Boys whose parents had substance abuse problems at age 7 had significantly higher raw ($t = 2.38, P = .018$) and residualized ($t = 2.39, P = .018$) proactive (but not reactive) scores at age 16 years.

Single-parent status—Age 7 family configuration was significantly associated with residualized proactive (but not reactive) aggression scores at age 16 ($F = 3.01, P = .03, d = 0.38$), with boys alone with their mother having higher scores than boys from intact homes ($P < .008$).

Criterion Validity

Violent strong-arm tactics—Participants classified as having participated in violent strong-arm tactics at age 7 years were compared to nonviolent controls to test the hypothesis that use of this proactive aggression tactic would be associated with higher proactive, but not reactive, aggression during adolescence at age 16. Those using violent strong-arm tactics had significantly higher raw proactive ($t = 2.28, df = 285, P = .02, d = 0.48$), but not reactive, aggression scores ($P = .14$) 9 years later, and also had higher residualized proactive ($t = 1.8, df = 285, P = .041, d = 0.38$), but not reactive ($P = .38$), aggression scores.

Initiating fights—Boys rated as initiating fights at age 7 had significantly higher scores on raw proactive ($t = 4.45, df = 331, P = .0001, d = 0.49$), reactive ($t = 2.15, df = 331, P = .032, d = 0.24$), and total ($t = 3.51, df = 331, P = .001, d = 0.39$) aggression scores at age 16. Residualized proactive ($t = 4.0, df = 331, P = .0001, d = 0.44$), but not reactive ($P = .339$), scores were also significantly higher in this group.

Fights a lot—Boys whose mothers rated them as fighting a lot at age 7 years had higher scores on raw proactive ($t = 2.79, df = 331, P = .006, d = 0.31$), reactive ($t = 2.90, df = 331, P = .004, d = 0.32$), and total ($t = 3.13, df = 331, P = .002, d = 0.35$) aggression scores at age 16, but not on residualized proactive ($P = .13$) and reactive ($P = .16$) aggression.

Serious delinquency—Delinquency seriousness classification groups at age 16 differed significantly on raw proactive ($F(5,320) = 11.3, P = .0001, d = 1.84$), reactive ($F(5,320) = 7.93, P = .0001, d = 1.39$), and total ($F(5,320) = 11.6, P = .0001, d = 1.80$) aggression raw scores at age 16. The seriously violent (most seriously delinquent) group had significantly higher raw proactive, reactive, and total aggression scores than the serious delinquent group, and all other groups ($P < .05$). Analysis of residualized scores showed a group effect on purely proactive (but not reactive) aggression scores ($F(5,320) = 3.31, P = .006, d = 0.87$), with the seriously violent group again scoring significantly higher ($P < .05$) than all other groups.

Convergent Validity

Child Behavior Checklist Aggression and Delinquency Scales—All three aggression scales at age 16 correlated at a low level, but significantly and in the positive direction, with mothers ratings of aggression (top line, Table IV) and delinquency (second line, Table IV) on the CBCL at age 16. Residualized proactive, but not reactive, scores correlated significantly with the Delinquency Scale.

Hostility-Aggression Scale—Raw proactive, reactive, and total aggression scales at age 16 were significantly and positively correlated with the age 16 self-report Hostility-Aggression Scale (r 's = .38–.51, $P < .0001$). Residualized scores were significant for reactive (but not proactive) aggression (see Table IV).

Discriminant Validity

Non-externalizing behavior problems—Raw and residualized age 16 aggression scores did not correlate significantly with age 16 withdrawal, somatic complaints, thought problems, and social problems, indicating some degree of discriminant validity to the aggression scales (see Table IV).

DISCUSSION

This study finds that proactive and reactive aggression can be reliably and validly assessed by a brief self-report questionnaire with a reading age of 8 years. Confirmatory factor analysis supported the hypothesized two-factor proactive–reactive structure as a significantly better fit to the data than a one-factor aggression model, a finding that was replicated from one independent subsample to another. Key findings from prospective and concurrent assessments are that residualized proactive aggression at age 16 is uniquely characterized at age 7 by initiation of fights, strong-arm tactics, delinquency, poor school motivation, poor peer relationships, single-parent status, low social class families, poorly educated and unemployed fathers, substance-abusing parents, and hyperactivity, and at age 16 by psychopathic personality, blunted affect, and serious violent offending. Residualized reactive aggression was uniquely characterized at age 16 by impulsivity, hostility-aggression, social anxiety, lack of close friends, unusual perceptual experiences, odd speech, and ideas of reference. Both forms of aggression (raw scores) were associated with excessive fighting at age 7 and also at age 16 by paranoid ideation and stimulation seeking. Findings draw a differential picture of the proactively aggressive adolescent as being psychopathy-prone, seriously violent, and emanating from a poor social background, whereas the reactively aggressive adolescent is more impulsive, anxious, and having schizophrenia-spectrum characteristics hallmarked by reality distortion and information-processing abnormalities. Findings highlight the potential importance of differentiating these different forms of aggression in order to obtain a clearer understanding of the etiology of aggression in adolescents.

Dodge et al. [1997] have commented “The antecedents of chronic proactive aggressive behavior in the absence of high levels of reactive aggression remain elusive” (p 44). A key goal of the present study has been to help establish some of these elusive processes. By residualizing proactive aggression scores, their relationship to external variables could be more effectively isolated from reactive aggression, and a surprising number of differential relationships were observed for this form of aggression. As hypothesized, proactive aggression was differentially correlated with maternal ratings of psychopathic personality, as well as blunted affect. Other early differential relationships were consistent with their status as “fledgling psychopaths” [Lynam, 1996]. Their strong-arm tactics, delinquency, and initiation of fights (all at age 7) are consistent with the early onset of antisocial behavior that characterizes adult psychopaths [Forth, 1995], as are the other early factors of parental substance abuse, parental absence, negative socio-demographic home characteristics [Koivisto and Haapasalo 1996; Marshall and Cooke, 1999], and hyperactivity [Lynam, 1996]. These findings suggest that proactive (but not reactive) aggression is an adolescent indicator of psychopathic personality, but it must be also recognized that not all proactively aggressive boys have a psychopathic personality.

One inconsistency in the literature concerns which of the two forms of aggression is most related to later problem behavior. While the social information-processing impairments and

lack of inhibitory control in reactive aggressive individuals might suggest a more negative outcome in this group, two prior prospective studies have shown that proactive (but not reactive) aggression is related to later delinquency and criminality [Pulkkinen, 1996; Vitaro et al. 1998]. Although there were approximately the same number of items in each of the aggression subscales of the RPQ, proactive aggression items were endorsed much less frequently than reactive aggression items, with an effect size difference of $d = 1.35$. Reactive aggression total scores were 2.55 times higher than proactive scores, suggesting that reactive aggression may be more adaptive and quasi-normative, and proactive more pathological. This is suggested not only by the relative infrequency of proactive aggression, but also by the fact that in the current study purely proactive (but not reactive) aggression scores were associated with serious violent offending up to age 16, and also that proactive aggression was more associated with negative early psychosocial processes. While proactive aggression may be indicative of a psychopathic personality, reactively aggressive children may consist of two subgroups: one showing a relatively adaptive reaction to current challenges to their social status but relatively normal long-term outcome, and the other a psychiatrically more disturbed (e.g. schizotypal) group who go on to develop longer-term problem behavior. Subgroups of reactive aggression with differential outcomes may partly account for any discrepant findings on outcome.

Prior social cognition research has shown that reactive aggression is characterized by social information-processing deficits [Crick and Dodge, 1996; Dodge and Coie, 1987], executive function deficits [Giancola et al., 1996], and schizophrenia [Vitiello et al., 1990]. Findings of the current study extend this perspective by demonstrating that residualized reactive aggression was related to schizotypal traits that reflect cognitive–perceptual deficits, specifically, unusual perceptual experiences, ideas of reference, paranoid ideation, and odd speech. It is likely that reality distortion, quasi-delusional belief systems, and paranoid ideation can result in misinterpretations of social intent, which in turn may predispose to reactive aggression. Prior research has suggested that there exists a subgroup of antisocial and violent individuals who are characterized by schizotypal features [e.g. Raine et al., 1999]. In complementary fashion, recent research has identified a subgroup of schizotypal individuals characterized by impulsivity, anger/hostility, and self-damaging acts [Torgersen et al., 2002]. The current findings give rise to the provisional hypothesis that such subgroups are particularly characterized by reactive forms of aggression and antisocial behavior, and extend the personality correlates of reactive aggression from the realms of impulsivity and social anxiety into schizotypal symptomatology. In contrast, the type of aggression and violence linked with schizophrenia-spectrum disorders is less likely to be linked to the more planned and regulated proactive form of aggression, although it should be noted that both reactive and proactive aggression were linked to paranoid ideation, while proactively aggressive children also showed the blunted affect that might be expected of psychopathic-like adolescents.

Despite several consistencies in the literature of reactive and proactive aggression, there are also inconsistencies. In addition to the issue of behavioral outcome noted above, some studies have provided mixed support for the notion of information-processing deficits in reactive aggressives [e.g. Dodge et al., 1997]. Similarly, while some studies find reactively aggressive children to be unpopular and victimized [e.g. Schwartz et al., 1998], some studies find proactively aggressive children to be more unpopular with peers [e.g. Dodge et al., 1997]. Furthermore, gender differences in the correlates of proactive and reactive aggression [Connor et al., 2003], including long-term outcome [Pulkkinen, 1996], have been reported, and consequently the current findings from males may or may not generalize to females. Kempes et al. [2005] have also argued that differences in age in the populations studied could in part account for discrepancy in findings. The use of a self-report measure of reactive–proactive aggression such as the RPQ in future studies of both male and female adolescents and young

adults could help extend research on these forms of aggression and help provide a resolution to broader inconsistencies in the literature.

The significant relationships emerging for residualized proactive and reactive aggression were of modest size, with effect sizes (Cohen's d) ranging from 0.22 to 0.74 [Cohen, 1988]. On the one hand, this underscores the fact that distinctions between proactive and reactive aggression may exist more in degree than in absolute kind, and that these subtypes of aggression have much in common. Alternatively, residualized scores are less reliable than raw scores because they contain a higher proportion of error variance [Cronbach, 1970]. As such, effect sizes for these residualized scores should be viewed as conservative floor estimates of the true effect, and that differences between proactive and reactive aggression may well be underestimated in this study. Nevertheless, residualization of proactive and reactive scores against each other provides a stringent test of differential effects, and can offer a valuable method in future studies for assessing the unique differences between proactive and reactive aggression. Such residualized scores also have the advantage of being free of the shared method variance confound which is a significant problem in some studies. Future studies using structural equation modeling could provide an alternative approach to dealing with error variance and potentially produce stronger effect sizes than those obtained here.

Results as a whole are generally supportive of models of proactive and reactive forms of aggression. Furthermore, findings address several gaps in the literature. To our knowledge, there has been only one prior study of proactive and reactive aggression in adolescence [Pulkkinen, 1996], a critical time in the development of aggressive behavior. Few prior studies have demonstrated prospective relationships between early psychosocial factors in childhood and proactive–reactive aggression 9 years later in a large community sample. Importantly, there have been few demonstrations of the differential characteristics of proactive and reactive aggression controlling for each form of aggression. While studies with multiple informant sources have significant advantages, self-reports have the significant advantage that the intrinsic motivation for the aggressive act, and which forms the critical distinction between proactive and reactive aggression, is best known to the individual and may be obscure to independent observers. Future understanding of aggression must account for the heterogeneity of aggression, and the RPQ provides a brief but reliable and valid self-report instrument to help further this process.

APPENDIX: A

The Reactive–Proactive Questionnaire (RPQ) scores (0, 1 or 2) for proactive aggression items (2, 4, 6, 9, 10, 12, 15, 17, 18, 20, 21, 23) and reactive items (1, 3, 5, 7, 8, 11, 13, 14, 16, 19, 22) are summated to form proactive and reactive scales. Proactive and reactive scale scores are summated to obtain total aggression scores.

Instructions

There are times when most of us feel angry, or have done things we should not have done. Rate each of the items below by putting a circle around 0 (never), 1 (sometimes), or 2 (often). Do not spend a lot of time thinking about the items—just give your first response. Make sure you answer all the items (see below).

How often have you...

- | | | | |
|--|---|---|---|
| 1. Yelled at others when they have annoyed you | 0 | 1 | 2 |
| 2. Had fights with others to show who was on top | 0 | 1 | 2 |
| 3. Reacted angrily when provoked by others | 0 | 1 | 2 |

4. Taken things from other students	0	1	2
5. Gotten angry when frustrated	0	1	2
6. Vandalized something for fun	0	1	2
7. Had temper tantrums	0	1	2
8. Damaged things because you felt mad	0	1	2
9. Had a gang fight to be cool	0	1	2
10. Hurt others to win a game	0	1	2
11. Become angry or mad when you don't get your way	0	1	2
12. Used physical force to get others to do what you want	0	1	2
13. Gotten angry or mad when you lost a game	0	1	2
14. Gotten angry when others threatened you	0	1	2
15. Used force to obtain money or things from others	0	1	2
16. Felt better after hitting or yelling at someone	0	1	2
17. Threatened and bullied someone	0	1	2
18. Made obscene phone calls for fun	0	1	2
19. Hit others to defend yourself	0	1	2
20. Gotten others to gang up on someone else	0	1	2
21. Carried a weapon to use in a fight	0	1	2
22. Gotten angry or mad or hit others when teased	0	1	2
23. Yelled at others so they would do things for you	0	1	2

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TABLE I

Factor Loadings (a) and Model-Fitting (b) Results for the Two Independent Samples and Total Sample Comparing the Null Model with the One-Factor (General Aggression) Model and the Two-Factor (Proactive-Reactive) Model

	Reactive			Reactive		
	S1	S2	Total	S1	S2	Total
<i>(a) Factor loadings</i>						
Yelled when annoyed	.40	.52	.48			
Angry when provoked	.46	.67	.59			
Angry when frustrated	.51	.63	.59			
Temper tantrums	.46	.52	.51			
Damaged things when mad	.64	.62	.63			
Angry when don't get way	.59	.58	.58			
Mad when lost a game	.40	.49	.46			
Angry when threatened	.47	.49	.49			
Felt better after hitting	.70	.61	.65			
Hit to defend self	.59	.55	.56			
Hit when teased	.66	.65	.65			
Fight for status				.58	.49	.52
Taken things from others				.59	.55	.56
Vandalized for fun				.53	.65	.62
Gang fight to be cool				.62	.57	.59
Hurt others to win game				.51	.58	.56
Force to manipulate others				.57	.61	.61
Force to obtain money				.69	.43	.52
Threatens and bullies				.56	.66	.63
Obscene phone calls for fun				.41	.58	.52
Manipulate others to gang up				.55	.59	.56
Carried weapon for use				.63	.64	.64
Yelled to manipulate				.63	.56	.59
<i>(b) Fit indices</i>						
	χ^2	df	AIC	CFI	NNFI	IFI
						RMSEA

	Reactive			Reactive		
	S1	S2	Total	S1	S2	Total
Sample 1						
Null model	1314	253	808			
One factor	474	230	14	.77	.77	.77 .08
Two factor	294	229	-163	.86	.84	.87 .04
Sample 2						
Null model	1509	253	1003			
One factor	495	230	35	.79	.79	.79 .08
Two factor	296	229	-161	.90	.89	.91 .041
Total sample						
Null model	2478	253	1972			
One factor	621	230	161	.82	.81	.82 .072
Two factor	334	229	-123	.91	.90	.91 .037

S1 ($N = 170$) = replication sample 1, S2 ($N = 164$) = replication sample 2, total sample = 334.

AIC, Akaike information criterion; RMSEA, root mean-squared error of approximation index; CFI, comparative fit index; NNFI, non-normed fit index; IFI, Bollen incremental fit index.

All χ^2 values are statistically significant ($P < .0001$).

TABLE II

Means, SDs, and Coefficient α for Reactive–Proactive Scale Scores for the Two Replication Samples and the Pooled Total Sample

Scale	Sample 1 ($N = 170$)	Sample 2 ($N = 164$)	Total ($N = 334$)
Reactive			
Mean	6.87	7.42	7.14
Median	2.0	1.0	2.0
SD	3.97	4.39	4.18
α	0.81	0.86	0.84
Proactive			
Mean	2.74	2.84	2.79
Median	7.0	7.0	7.0
SD	3.26	3.67	3.47
α	0.84	0.87	0.86
Total aggression			
Mean	9.61	10.26	9.93
Median	8.0	8.0	8.0
SD	6.55	7.39	6.97
α	0.89	0.91	0.90

Construct Validity of Proactive-Reactive Aggression Scales Based on Correlations With (a) Schizotypal Personality Questionnaire (SPQ) at Age 16 ($N = 332$) and (b) Mother's Ratings of Psychopathy and Self-Report Personality Measures at Age 16 ($N = 334$)

TABLE III

	Proactive	Reactive	Total	Purely proactive	Purely reactive
<i>(a) Schizotypal personality</i>					
SPQ Subscales					
Ideas of reference	.268**	.327**	.330**	.072	.198**
Social anxiety	.191**	.276**	.262**	.013	.196**
Magical thinking	.161**	.160**	.176**	.075	.071
Unusual percept. exp.	.275**	.323**	.330**	.084	.188**
Odd behavior	.219**	.219**	.240**	.100	.099
No close friends	.205**	.214**	.231**	.082	.108*
Odd speech	.240**	.281**	.288**	.074	.163**
Blunted affect	.270**	.230**	.273**	.158**	.069
Paranoid ideation	.354**	.348**	.385**	.167**	.152**
SPQ Subfactors					
Cognitive-Perceptual	.341**	.380**	.398**	.124*	.205*
Interpersonal	.321**	.332**	.361**	.125*	.166**
Disorganized	.262**	.287**	.303**	.097	.152**
Total SPQ	.339**	.373**	.395**	.114*	.203**
<i>(b) Psychopathy and personality</i>					
Maternal ratings					
Psychopathy	.259**	.169**	.230**	.196**	-.001
Self-report					
Impulsivity	.185**	.269**	.253**	.013	.193**
Stimulation seeking	.262**	.272**	.294**	.109*	.133*
Trait anxiety	.018	.127*	.085	-.088	.152*

* $P < 0.05$, two-tailed.

*** $P < 0.01$, two-tailed.

TABLE IV

Convergent, Discriminant, and Construct Validity of Reactive–Proactive Scales Based on Correlations with CBCL Scales ($N = 327$) and Self-Report Hostile-Aggressive Personality at Age 16 ($N = 334$)

	Proactive	Reactive	Total	Purely proactive	Purely reactive
Convergent validity					
Aggression	.154**	.115*	.145**	.103	.021
Delinquency	.200**	.109*	.165**	.169**	-.026
Hostility-aggression	.383**	.519**	.501**	.066	.348**
Discriminant validity					
Withdrawn	.074	.108	.102	.002	.081
Somatic complaints	.026	.074	.057	-.031	.076
Social problems	.019	-.016	-.001	.040	-.038
Thought problems	.078	.095	.096	.020	.059
Construct validity					
Attention problems	.150**	.102	.136*	.108	.008
Anxious/Depressed	.137*	.126*	.144**	.070	.050

* $P < 0.05$, two-tailed.

** $P < 0.01$, two-tailed.