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Characterizing Aggressive Behavior with the Impulsive/ Premeditated Aggression Scale among Adolescents with Conduct Disorder

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Abstract

This study extends the use of the Impulsive/Premeditated Aggression Scale for subtyping aggressive behavior among adolescents with Conduct Disorder. Of the Conduct Disorder symptoms, aggression has the strongest prognostic and treatment implications. While aggression is a complex construct, convergent evidence supports a dichotomy of impulsive and premeditated aggressive subtypes that are qualitatively different from one another in terms of phenomenology and neurobiology. Previous attempts at measuring subtypes of aggression in children and adults are not clearly generalizable to adolescents. Sixty-six adolescents completed a questionnaire for characterizing aggression (Impulsive/Premeditated Aggression Scale), along with standard measures of personality and general functioning. Principal components analysis demonstrated two stable factors of aggression with good internal consistency and construct validity. Compared to the premeditated aggression factor, the impulsive aggression factor was associated with a broader range of personality, thought, emotional, and social problems. As in the adult and child literature, characterization of aggressive behavior into two subtypes appears to be relevant to understanding individual differences among adolescents with Conduct Disorder.

Keywords

adolescence; aggression; impulsiveness; personality; conduct disorder

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1. Introduction

Despite the importance of aggression to the prognosis of Conduct Disorder, psychiatrists do not have self-report instruments to characterize this behavior in adolescents. Aggressive behavior is a primary symptom of Conduct Disorder (CD), which is a disturbance emerging during childhood or adolescence that is defined as a pervasive pattern of behavior involving violation of others' basic rights and/or major age-appropriate societal norms (American Psychiatric Association, 2000). Within the CD diagnosis there are four types of characteristic behaviors: serious violation of rules, deceitfulness or theft, destruction of property, and aggression toward people or animals. While multiple factors appear to contribute to the expression of conduct problems and aggressive behaviors (e.g., cognitive ability, parent characteristics, peer relationships, early environmental stress, and demographics), there is little consensus as to what factor, or combination of factors, function as predictors or mediators of treatment outcome (Conduct Problems Prevention Research Group, 2002; for reviews, see Yoshikawa, 1994 and Hinshaw, 2002).

On the other hand, it is the expression of the aggressive behavior itself that has been shown to be an important predictor of behavioral health outcomes among those with CD. For example, aggressive behavior (along with Oppositional Defiant Disorder) is a significant predictor for development of CD (Patterson, 1993; Loeber et al., 1998), of treatment outcome (Loeber et al., 1992, 1993), and of impaired functioning (Loeber et al., 2000) and antisocial behaviors (Lynam, 1996; Huesmann et al., 2002) extending into adulthood. In fact, findings from a 22-year longitudinal study revealed that, while many childhood variables (e.g., low IQ, poor housing, lower parent education) were individually related to criminality in adulthood, these variables "did not add to predicting criminality once early aggression was considered" (Huesmann et al., 2002, p.204). Collectively, these studies indicate that when antisocial behaviors (e.g., destruction of property, physical fighting, and physical cruelty) are present in childhood there is an increased risk for continued psychosocial problems well into adulthood (for reviews, see Olweus, 1979, Yoshikawa, 1994, and Frick and Loney, 1999).

While identifying and targeting specific antecedents to antisocial behaviors is undoubtedly important to treatment outcomes, defining and characterizing subtypes of aggressive behavior has a clear influence on research outcomes (Barratt et al., 2000) and implications for determining etiology of, and treatment strategies for, aggressive disorders (Coccaro et al., 1991; Yoshikawa, 1994; Crick and Dodge, 1996; Barratt et al., 1997a; Brown and Partons, 1998; Vitaro et al., 2002). For these reasons, identifying a valid method for classification of aggression has important clinical as well as research relevance, particularly in light of the growing movement to target pharmacological and non-pharmacological interventions for aggressive behaviors (e.g., Steiner et al., 2003; National Institutes of Health, 2004). The current study was designed to validate the Impulsive/Premeditated Aggression Scale (Stanford et al., 2003a) for characterization of aggressive subtypes among adolescents with Conduct Disorder.

Aggressive behavior is a widely heterogeneous construct, which is one barrier to understanding adolescent aggression. Within the animal literature, at least seven subtypes of aggression have been identified and the behavior among humans is dimensional as well (Vitiello and Stoff, 1997). Important distinctions among aggressive subtypes include: level of planning, appreciation for consequences, and affective intensity associated with the aggressive acts. Based on these distinctions, researchers investigating aggressive subtypes in human adults and young children have commonly concluded that there is a dichotomy of aggressive subtypes that have variously been described as: [a] impulsive, reactive, affective, or non-planned; and [b] premeditated, proactive, instrumental, predatory, or controlled (e.g., Heilbrun et al., 1978; Coccaro, 1989; Atkins et al., 1993; Barratt et al., 1997a; Vitaro et al., 2002; McEllistrem, 2004). For the purpose of this investigation, the terms impulsive aggression and premeditated

aggression are used to facilitate comparison to similar adult literature (Stanford et al., 2003a;Kockler et al., 2006). We use the term impulsive aggression to refer to spontaneous aggressive outbursts that are out of proportion to the provoking event, while premeditated aggression describes aggressive behaviors that are planned, controlled, and/or goal-oriented (Barratt et al., 2000).

Individuals classified as expressing either impulsive or premeditated aggressive behaviors differ from one another across a variety of domains, including: social adjustment, emotional function, cognitive ability, biological function, physiological reactivity, and treatment response. For instance, impulsive aggressive adults have diminished language ability (Barratt et al., 1997b) and lower cerebrospinal fluid 5-hydroxyindoleacetic acid concentrations (Linnoila et al., 1983), relative to premeditated aggressors. Compared to non-aggressive adults, impulsive aggressors have reduced executive functioning (Villemarette-Pittman et al., 2002) and decreased cortical activation (Mathias and Stanford, 1999;Houston and Stanford, 2001), as well as central serotonergic dysregulation (Coccaro, 1989; Coccaro, et al., 1991; Coccaro and Kavoussi, 1997). Further, impulsive aggression is associated with self-reported impulsivity, neuroticism, physical aggression, and anger (Stanford et al., 2003a). While the adult literature has largely focused on cognitive and biological mechanisms involved in impulsive aggression, the research on childhood aggression tends to focus on social information processing, peer relations, and emotional dysregulation (Dodge et al., 1997;Waschbush et al., 1998). Specifically, impulsive aggression in children is associated with high levels of hostile behaviors (Atkins and Stoff, 1993;Atkins et al., 1993) and hostile attribution bias (Schwartz et al., 1998). Compared to children with premeditated forms of aggression, impulsive-aggressive children have higher ratings on measures of neuroticism, including numerous somatic and anxious/depressive symptoms (Dodge et al., 1997). Socially, impulsive aggression in children is related to rejection and early childhood physical abuse from parents (Dodge et al., 1995) and victimization by peers (Dodge and Coie, 1987;Schwartz et al., 1998). Despite the wide range of cognitive, emotional, social, physiological, and biological disturbances associated with impulsive aggression, individuals expressing this aggressive subtype tend to respond well to pharmacological treatment (Coccaro and Kavoussi, 1997;Barratt et al., 1997a;Stanford et al., 2001,2005). Taken together, children and adults who emit predominantly impulsive types of aggression would also be expected to show increased levels of general impulsivity, hostility, and difficulties with cognition, socialization, and mood.

Results from research with individuals who exhibit predominantly premeditated aggression suggests that their overall functioning tends to be better than their impulsive aggressive counterparts. For instance, adults with premeditated aggression have relatively normal performance on tests of executive function (Stanford et al., 2003b), and they emit an appropriate level of cortical activation on physiological measures (Raine et al., 1998;Stanford et al., 2003b). However, relative to impulsive aggressors, adults with premeditated aggression score high on measures of psychopathic traits (e.g., callousness and unemotionality; Cornell et al., 1996), and their aggressive behavior is largely unresponsive to pharmacological intervention (Barratt et al., 1997a). Self-reported premeditated aggression is inversely associated with measures of extraversion, but positively associated with psychoticism, neuroticism, impulsivity, verbal aggression, and physical aggression. Premeditated aggressive adults score high on measures of anger and hostility questionnaires (Stanford et al., 2003a), although children with premeditated forms of aggression do not have elevated hostility/frustration ratings (Little et al., 2003). Children with premeditated aggression tend to expect positive outcomes from aggressive actions and lack remorse or empathy regarding the use of force (Smithmyer et al., 2000), which may lead to the tendency to use aggression as a tool to achieve a desired outcome. Additionally, children who are rated as more premeditated in their use of aggression have relatively normal parent interactions, peer relations, and ratings of self-worth (Dodge et al., 1997) and are less impaired overall in comparison to their impulsive aggressive

counterparts (Waschbusch et al., 1998). The child and adult aggression literature together supports the conclusion that premeditated aggression may be best characterized by a disturbance of personality rather than the cognitive or cortico-physiological disturbances observed with the impulsive-aggressive subtype.

While there is growing support for the characterization of aggression, classifications of aggressive subtypes from studies of adults and young children provide limited generalizability to adolescents with CD. Studies on classification of aggression have tended to sample either adults (e.g. Barratt et al., 1997a) or young children (e.g., kindergarten through 3rd grade; Dodge et al., 1997) and, as a result, understanding of impulsive or premeditated aggression in the developmentally distinct period of adolescence is limited, despite the long history of interest in adolescent aggression (e.g., Dollard et al., 1939). Further, many of the adult studies examining subtypes of aggression have excluded participants with DSM Axis I and II disorders (e.g., Mathias and Stanford, 1999; Villemarette-Pittman et al., 2002; Stanford et al., 2003a), even though studies with children suggest psychiatric condition is relevant to dichotomizing aggressive subtypes (e.g., Dodge et al., 1997). The current study extends this previous research by examining aggressive subtypes among adolescents with a psychiatric diagnosis of CD.

Valid self-report measures of characterizing subtypes of aggression would be an important adjunct to current methodologies for assessment of aggressive subtypes in adolescents. Many studies that have attempted to characterize aggression in children have relied on clinical judgement (e.g., Blanchard, 1984) or observations from parents, teachers, peers, or hospital staff (e.g., Dodge and Coie, 1987; Vitiello et al., 1990). The predictive precision of externalizing behavioral patterns has been shown to be less accurate largely because of observer reports from adult informants (Bennett et al, 1998; Hinshaw, 2002). Relying solely on observer-ratings of adolescent behavior may be problematic because: (1) there tends to be a low level of agreement between informants regarding adolescents' aggressive behavior (Loeber et al., 2000; Little et al., 2003); (2) the validity and reliability of adolescent self-reports of health or psychopathology increases with age, while the validity of parent and/or teacher reports decreases with age (Guyatt et al., 1997; Kamphaus and Frick, 2002); and (3) answering questions regarding the motivating influence behind an aggressive act requires personal insight that may not be evident to an observer (Little et al., 2003). Taken together, there is general support for the use of self-report measures of aggression in adolescent samples. However, the validity of self-reported subtypes of aggression has not been satisfactorily investigated among adolescents in general, or specifically among those most at risk for aggressive behaviors like Conduct Disorder.

The current study was designed to extend the use of the Impulsive and Premeditated Aggression Scale to an adolescent-aged sample with Conduct Disorder. Based on the volume of work outlined above that indicates a dichotomy of aggressive subtypes, and based on the most recent adult study using the IPAS (Kockler et al., 2006), our primary hypothesis was that the IPAS would yield two factors (Impulsive and Premeditated) that demonstrate internal consistency, construct, and concurrent validity. Furthermore, based on correlations of the previous IPAS study of a community-recruited sample of aggressive adults (Stanford et al., 2003a), we predicted that both the Impulsive and Premeditated Aggression scales would be positively correlated with the Barratt Impulsiveness Scale Total Score (BIS-11, Patton et al., 1995), the Eysenck Personality Questionnaire – Junior (EPQ-J; Eysenck and Eysenck, 1975) Neuroticism subscale, and the Buss-Perry Aggression Questionnaire (BPAQ; Buss and Perry, 1992) Physical Aggression subscale. We also predicted that the IPAS Impulsive Aggression scale would correlate positively with the BPAQ Anger subscale, while the Premeditated Aggression scale would correlate positively with the EPQ-J Psychoticism subscale and the BPAQ Verbal Aggression and Hostility subscales, and negatively with the EPQ-J Extroversion subscale.

2. Method

2.1. Participants

Participants were recruited from the inner-city area of Houston, TX. Parents of potential participants responded to newspaper advertisements for adolescents with disruptive behaviors. For all respondents, an initial telephone screening was conducted to determine the suitability of their adolescent for the study (e.g., age 13–17 and physically healthy with symptoms of Conduct Disorder and physical aggression). Based on the results of this telephone survey, potential participants and their parent/guardian were invited to the laboratory for a more extensive screening. During this onsite screening, the psychiatric condition and health history of the adolescent was examined by using a semi-structured interview (Kiddie-SADS: Present and Lifetime Version; Kaufman et al., 1997), conducted with both the adolescent and parent separately. The psychiatric diagnoses were determined by consensus of the research team (authors CWM and DMD, and our team psychiatrists - authors ACS and FGM) by review of all available information from both the adolescent and parent using the *Best Estimate Diagnostic Procedure* (Leckman et al., 1982;Kosten and Rounsaville, 1992). All adolescents recruited for the study met DSM-IV criteria for Conduct Disorder (American Psychiatric Association, 2000). The adolescent's aggression history was measured using the Lifetime History of Aggression interview (Coccaro et al., 1997) and only those with a history of physical fighting were included.

Potential participants were excluded if there was evidence of: [1] low intelligence (IQ < 70; Wechsler Abbreviated Scale of Intelligence -WASI; The Psychological Corporation, 1999), [2] reading deficit (standard score \leq 69; Wide Range Achievement Test-III - WRAT3 tan version; Wilkinson, 1993), [3] a neurological or seizure disorder, [4] psychoactive medication use within the past year, [5] evidence of recent use of alcohol (Alco-Sensor, Intoximeters Inc., St. Louis, MO) or other drugs (i.e., marijuana, cocaine, benzodiazepines, amphetamines; Syva[®] RapidTest d.a.u.[®] 4; Dade Behring, Cupertino, CA), or [6] psychiatric diagnoses other than Conduct Disorder. However, comorbidity with Attention Deficit/Hyperactivity Disorder was not exclusionary due to the frequent co-occurrence of these conditions (Walker et al., 1987;Soltys et al., 1992;Loeber and Keenan, 1994). Participants' reported use of illicit drugs within the past year was also not exclusionary.

Prior to participation, written informed consent was obtained from each adolescent and their parent/guardian. All testing was conducted between 8:00 am and 4:30 pm. Adolescents and parents/guardians each earned approximately \$8 dollars per hour for their participation. This study was approved by the institutional review board of the University of Texas Health Science Center at Houston, which was the performance site for all data collection.

2.2. Instruments

Upon entry to the study, a series of self-report questionnaires was administered to characterize aggression, personality, and general functioning.

2.2.1. Impulsive/Premeditated Aggression Scale (IPAS)—The IPAS (Stanford et al., 2003a) is a 30-item self-report questionnaire used to rate aggressive acts occurring over the past six months. Items are scored on a five-point scale (1 = Strongly Disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree). In the initial validation study conducted with 93 aggressive adults recruited from the community (Stanford et al., 2003a), two items were excluded based on the item analysis and the remaining items yielded three separate factors: Premeditated Aggression (e.g., *Some of the acts were attempts at revenge*), Impulsive Aggression (e.g., *I lost control of my temper during the acts*), and Familiarity with Target/Remorse (e.g., *I knew most of persons involved in the incidents*). The factor loadings included

12 Premeditated Aggression, 8 Impulsive Aggression, and 6 Familiarity items. In a subsequent study of 86 adults recruited from a forensic state hospital (Kockler et al., 2006), the initial item analysis retained all items, and the PCA only identified the two factors of Premeditated (13 items) and Impulsive Aggression (12 items).

These previous adult validation studies have published internal consistency, construct validity, and concurrent validity for the IPAS measure. The internal consistency coefficients for the IPAS range from 0.72 to 0.82 (Cronbach's alpha; Stanford et al., 2003a; Kockler et al., 2006). The construct validity (relative to Impulsive Aggression factors) was demonstrated by a significantly greater association of the Premeditated Aggression Scale with Psychoticism, Extraversion, and Neuroticism scores on the Eysenck Personality Questionnaire (Eysenck and Eysenck, 1975), Physical and Hostility scores on the Buss-Perry Aggression Questionnaire (Buss and Perry, 1992), and Social Consequences and Self-Directed Aggression scores on the Lifetime History of Aggression (Coccaro et al., 1997). Conversely, the Impulsive Aggression scale (relative to Premeditated Aggression) demonstrated a significantly greater association with Anger scores on the Buss-Perry Aggression Questionnaire (Buss and Perry, 1992). Concurrent validity was demonstrated classifying the adults as predominantly impulsive or premeditated in their aggressive behavior. When comparing the classification of the IPAS to that of a semi-structured interview (i.e., Stanford and Barratt, 2001) the sensitivity of the Impulsive and Premeditated scales was 0.96 and 0.60, respectively.

2.2.2. Barratt Impulsiveness Scale-11 (BIS-11)—The BIS-11 (Patton et al., 1995) is a 30-item scale that assesses Motor, Attentional, and Nonplanning aspects of impulsivity, which are summed for a Total impulsiveness score. Items are scored on a four-point scale (1 = Rarely/Never, 2 = Occasionally, 3 = Often, 4 = Almost Always/Always), with higher scores indicating greater impulsivity. The internal consistency of the BIS-11 (Cronbach's alpha) among young adults has been shown to be 0.82 (Patton et al., 1995). Adult IPAS scores for both the Impulsive and Premeditated Aggression scales have been shown to be positively associated with the BIS Total Impulsiveness scores (Stanford et al., 2003a).

2.2.3. Eysenck Personality Questionnaire – Junior (EPQ-J)—The EPQ-J (Eysenck and Eysenck, 1975) is an 81-item scale for assessing broad aspects of personality in children and adolescents. The items are scored on a dichotomous scale (yes = 1, no = 0). The EPQ-J yields four scales, Eysenck's three factors of personality: Extraversion, Neuroticism, and Psychoticism, and a lie scale to verify valid responding. Published Cronbach's alpha for the ages used in the current study (13 – 17 years old) range from 0.61 to 0.86 (Eysenck and Eysenck, 1975). Research with the adult version of this scale found that the IPAS scores of the Premeditated Aggression scale are positively related to Neuroticism and Psychoticism scores and negatively associated to Extraversion scores, while scores of the Impulsive Aggression scale are positively associated to Neuroticism only (Stanford et al., 2003a).

2.2.4. Buss-Perry Aggression Questionnaire (BPAQ)—The BPAQ (Buss and Perry, 1992), and its earlier version (Buss and Durkee, 1957), are the most frequently used questionnaires for assessing hostility and aggression. This 29-item questionnaire contains brief statements (e.g., *Once in a while I can't control my urge to strike another person.*) to which a rater assigns a number ranging from 1 to 5, where 1 = *Not like me at all*, and 5 = *A lot like me*. This questionnaire yields a Total score and four subscale scores: Physical Aggression, Verbal Aggression, Anger, and Hostility. Among young adults, internal consistency coefficients of the BPAQ range from 0.72 to 0.85 (Cronbach's alpha; Buss and Perry, 1992). Research with adults (Stanford et al., 2003a) indicates the IPAS scores of the Premeditated Aggression scale are positively related to the Physical Aggression, Verbal Aggression, and Hostility subscale scores, while IPAS scores of the Impulsive Aggression scale are related to the Physical Aggression and Anger subscale scores.

2.2.5. Achenbach System of Empirically Based Assessment – Youth Self-Report (YSR)—The YSR is a self-report version of the popular Child Behavior Checklist (Achenbach and Rescorla, 2001). In the YSR, adolescents describe their level of adaptive function in terms of behavioral, emotional, and social problems. The scale has 112 items rated on a three point scale (0 = Not True; 1 = Somewhat or Sometimes True; 2 = Very True or Often True). These scores are used to identify syndromes of co-occurring problems on eight scales including: Anxious Depressed, Withdrawn Depressed, Somatic Complaints, Social Problems, Thought Problems, Attention Problems, Rule Breaking, and Aggressive Behavior. Internal consistency coefficients for the YSR range from 0.67 to 0.88 (Cronbach's alpha; Achenbach and Rescorla, 2001).

2.3. Data Analyses

Statistical analyses were conducted following the methodology used in the two previous adult IPAS validation studies (Stanford et al., 2003a;Kockler et al., 2006). First, an item analysis (Nunnally and Bernstein, 1994) was conducted to test whether IPAS items were relevant among an adolescent sample with Conduct Disorder in a pattern similar to the items established in adult samples. The item analysis included two steps. First, Pearson's product-moment correlations were computed to test for an adequate level of association between an individual item and its respective scale score minus the item of interest (i.e., item-total correlations). Second, *t*-tests were computed to determine whether upper and lower quartiles of scores are discriminable for each individual item. The items included in subsequent analyses demonstrated both: (1) a significant item-total correlation, and (2) significant differentiation of upper and lower quartile groups. A principal components analysis (PCA) was conducted using the remaining items with no assumptions regarding the number of potential factors. Lautenschlager's (1989) tables were used to determine the threshold for significant factors (Eigenvalue minimum of 2.0) and item factor loadings (Eigenvalue minimum of 0.40). These tables provide Eigenvalue criterion are widely used for this purpose (e.g. Stanford et al., 2003a;Kockler et al., 2006) and are based on a parallel analysis method for the determining the number of components to retain in the PCA (Lautenschlager, 1989). To simplify the factor structure and facilitate the reliability of factor interpretation (Thurstone, 1947;Cattell, 1978), a Varimax rotation (Kaiser, 1958) was used to obtain an orthogonal factor solution of the original factors. Stability of the factors resulting from the PCA was tested using the Guadagnoli and Velicer (1988) criteria of component saturation and stability index score. Finally, internal consistency was measured using Cronbach's alpha (Nunnally and Bernstein, 1994).

Construct validity of the IPAS was tested by examining the Pearson's product-moment correlations with the standardized measures of personality and general functioning administered in this study (using *t*-scores when they could be calculated from published normative data). Partial correlations were also conducted between each IPAS scale and the measures of personality and impaired functioning (e.g., BIS, above) to removed variance attributable to the opposite IPAS scale.

3. Results

3.1. Demographics

A sample of 66 adolescents (24 girls and 42 boys) with Conduct Disorder were recruited and included in all analyses. The median severity of Conduct Disorder symptoms was Moderate (Mild, $n = 11$; Moderate $n = 33$, Severe $n = 22$), the average number of current Conduct Disorder symptoms was 5.3 ($SD = 2.2$), and average age of CD onset was 8.4 years ($SD = 3.4$). Comorbidity with Attention Deficit Hyperactivity Disorder was present in 37% ($n = 25$) of the total sample. The sample was racially diverse: 51% African American ($n = 34$), 23% Hispanic ($n = 15$), 15% Caucasian ($n = 10$), and 11% multiethnic participants ($n = 7$). The median

educational level was 8th grade and the median total score on the Lifetime History of Aggression was eighteen. The average age of the sample was 14.5 years ($SD = 1.3$), WASI full scale intelligence score was 88.32 ($SD = 9.2$), and WRAT3 standard reading score was 100.94 ($SD = 14.05$).

3.2. Item Analysis

An item analysis was conducted on all 30 IPAS items to test whether the questions that were originally established among adult samples (Stanford et al., 2003a;Kockler et al., 2006) would be relevant to an adolescent sample with Conduct Disorder. Using the selection criteria from Nunnally and Bernstein (1994), four items were excluded from further analyses: (1) *I planned when and where my anger was expressed*; (2) *I typically felt guilty after the aggressive acts*; (3) *I understood the consequences of the acts before I acted*; and (4) *I was under the influence of alcohol or other drugs during the acts*. All four of these items produced significant factor loadings for adults on either the Impulsive or Premeditated scales (Stanford et al., 2003a;Kockler et al., 2006). The remaining 26 items were retained for further analyses.

3.3. Principal Components Analysis

A principal components analysis was conducted on the remaining 26 items to identify the number of aggressive subtypes (factors) that are relevant among an adolescent sample with CD. No *a priori* assumptions were made as to the number of factors that would emerge from the analysis. The principal component analysis yielded two factors accounting for 34% of the total variance (see Table 1): Factor 1 - Impulsive Aggression, and Factor 2 - Premeditated Aggression. Table 1 lists factor loadings from this study and from previous publications (i.e., Stanford et al., 2003a;Kockler et al., 2006) to provide for comparison between the outcomes of the adolescent, adult forensic, and adult community samples.

Lautenschlager's (1989) tables were used to determine the Eigenvalue criterion cutoff for interpreting the number of significant factors (2.0) and item loadings (0.40) resulting from the principal components analysis. An orthogonal factor solution was obtained using a Varimax rotation (Kaiser, 1958;Child, 1990). There were six items that did not have significant loading (< 0.40) on any factor and were excluded from further analyses: (1) *I feel my actions were necessary to get what I wanted*; (2) *I knew most of the persons involved in the incidents*; (3) *I feel I acted out aggressively more than the average person over the last six months*; (4) *When angry I reacted without thinking*; (5) *I was in control during the aggressive acts*; and (6) *I felt my outbursts were justified*.

3.4. Sample Size and PCA

Follow-up empirical tests were conducted to confirm that the factors yielded by the PCA were interpretable at the population level, given the sample size ($n = 66$). Guadagnoli and Velicer (1988) proposed a system for empirically testing whether factors found within a sample are stable and therefore interpretable with regard to the population. In this system, interpretability of the factors, referred to as stability, can be demonstrated by either of two comparisons: (1) component saturation; or (2) a stability index score. Component saturation is achieved when more than 3 items within a factor have loading of over 0.60. In this study, component saturation for each of the factors was demonstrated by four (Impulsive Aggression) and five (Premeditated Aggression) items with loadings over the 0.60 criterion. The stability index (Y) is calculated using the regression formula: $Y = 1.1(X_1) - 0.12(X_2) + 0.66$ (Formula 3; Guadagnoli and Velicer, 1988, p. 271], which takes into account the average factor loading (X_2) and the standard error of the correlation (X_1). Stability index scores of less than 0.01 support interpretation of factor scores at the population level. In this study, the criterion level was achieved with a stability index score of $Y = 0.001$. These empirical tests of component saturation and the

stability index score both support the interpretation of the two factors found in our adolescent sample using the principal components analysis.

3.5. Internal Consistency

The internal consistency was assessed using Cronbach's alpha, which is based on the average inter-item correlation. The Cronbach's alpha coefficients for the Impulsive Aggression and Premeditated Aggression scales were 0.82 and 0.78, respectively.

3.6. Construct Validity

Construct validity was investigated using correlations between both of the IPAS factor scales and a series of standard measures of personality and impaired functioning that have previously been shown to relate to impulsive or premeditated aggression (see Table II). To account for the effect of any intercorrelation between IPAS scales and their association with standard measures of personality and impaired functioning, a second set of correlations that partialled out the effect of the opposite IPAS scale was also computed (see Partial Correlations, Table II). In general, both of the IPAS scales were correlated with measures of Impulsivity (BIS-11), Psychoticism (EPQ-J), Anger (BPAQ), and Somatic Complaints (YSR). The Premeditated Aggression scale was the only factor associated with Physical and Verbal Aggression ratings (BPAQ), while the Impulsive Aggression scale was the only factor associated with Neuroticism (EPQ-J), Hostility (BPAQ), and a broad range of thought, emotional, and social problems (YSR). Neither the Impulsive Aggression nor Premeditated Aggression factors were correlated with any of the demographic characteristic scores.

4. Discussion

This study supports the interpretation of subtypes of aggression among adolescents with Conduct Disorder (CD). Our analyses identified two distinct factors (Impulsive Aggression and Premeditated Aggression) with strong psychometric properties including: (a) interpretability (i.e., factor saturation and stability), (b) internal consistency, and (c) construct validity. Of the two factors, the Impulsive Aggression scale was associated with the broadest range of personality disturbance and functional impairment. Taken together, these results support the use of the IPAS with adolescents from the community who have Conduct Disorder.

The purpose of this study was to validate and extend the use of the Impulsive and Premeditated Aggression Scale to an adolescent-aged sample experiencing Conduct Disorder. This was tested by following the analytic approach used in the previous adult community (Stanford et al., 2003a) and forensic (Kockler et al., 2006) validation studies. As predicted, the outcome of the analyses resulted in two factors, including Impulsive Aggression (IA) and Premeditated Aggression (PM) scales, which is consistent with the two factor solution found by Kockler and colleagues. Examination of the individual item loadings reveals both a number of similarities and differences from the previous adult validation studies (see Table II). For the PM factor we identified 7 items with sufficient loadings, while the previous adult studies both identified 13 items. The 7 items we identified corresponded to 5 (Stanford et al., 2003a) and 6 (Kockler et al., 2006) of the items from the PM factor from the previous studies. Examination of the individual item loadings in this study indicates the PM factor is composed of items centering on themes of satisfaction with conducting planned aggressive acts that targeted particular individuals. Items from the previous studies that did not load on the PM factor in this study tended to involve themes that included feelings of justification for aggressive acts. In general, these current findings suggest that our adolescent CD sample may have express premeditated aggressive acts that encompass a more narrow range of feelings and behaviors than those endorsed by adults.

In contrast to the PM factor findings, the current study identified more items (13) loading on the IA factor than the previous adult studies (10 and 12 respectively; Stanford et al., 2003a; Kockler et al., 2006). The current sample scores were most similar to that of the forensic adult sample with correspondence on 9 of the items. Examination of individual loadings reveals that several items on the current IA factor loaded on the PM factor in one or both of the previous adult studies. In particular, both adult studies found that item #16 (*The acts led to power over others or improved social status for me*) loaded on the PM factor. Conceptually it does not seem consistent that an item which describes how aggressive acts can lead to power or improved social status would load on the IA factor. However, it is unclear from the current findings whether adolescents perpetrated the aggressive acts with knowledge of the effects on power or status beforehand, or this realization occurred as a result of feedback received following the aggressive acts. If it is the later case, then item #16 loading on the IA factor may be seen as a reflection of experience rather than a motivating force behind the aggressive acts. A number of other items either did not load on the adults IA factor (items 13, 15, 22, and 27 Stanford et al., 2003a; items 11 and 19 Kockler et al., 2006) or were excluded during item analyses (items 19 and 28; Stanford et al., 2003a). These discrepancies appear to reflect adolescents' endorsement of impulsive aggressive acts as including confusion and an agitated emotional component, whereas the previous adult community sample endorsed more of a connection directly to anger as a precipitant to the aggressive acts (Stanford et al., 2003a). In general, the present findings suggest that impulsive aggression in our adolescent CD sample involves acts that are spontaneous, uncontrolled, and associated with negative mood states.

The IPAS appears to be appropriate for assessing the dimensional nature of subtypes of aggression. Many aggressive individuals exhibit mixed aspects of both impulsive and premeditated subtypes of aggressive acts (Dodge and Coie, 1987; Atkins et al., 1993; Barratt et al., 1997b) and aggressive typologies generally find a normal distribution of scores for aggressive acts ranging from purely impulsive to purely premeditated (Barratt et al., 2000). The two independent scales of the IPAS allow for characterization of aggression along both of these dimensions. Construct validity of these two scales is typically tested by relating scores on the IA and PM factor scores with other measures of personality and impaired functioning that have previously been shown to be related to impulsive or premeditated aggression (Vitaro et al., 2002; Stanford et al., 2003a). Consistent with the previous adult validation study of the IPAS (Stanford et al., 2003a), both the IA and PM factors were associated with higher scores on the measure of impulsivity (BIS-11), the PM factor was significantly related to Physical and Verbal Aggression (BPAQ), and the IM factor was related to Anger. In comparison to the premeditated aggression factor in this adolescent sample, the impulsive aggression factor showed correlations across a much broader range of personality and functional impairment measures, particularly when examining the results of the partial correlations that controlled for the effects of the opposite scale. While the PM factor showed relationships with four measures of personality and impaired function: Psychoticism (EPQ-J), and Anger, Verbal Aggression, and Physical Aggression (BPAQ), the IA factor in these adolescents included relationships with ten of the measures of personality and impaired function: Neuroticism and Psychoticism (EPQ-J), Physical Aggression and Anger (BPAQ), and a variety of emotional, thought, and social adjustment problems (YSR). Overall, these findings support the assertion that those who emit predominantly impulsive-type aggression exhibit more impaired functioning across a variety of domains related to thought, emotional regulation, and personality (Dodge et al., 1997; Waschbusch et al., 1998), while predominantly premeditated types of aggressors have a relatively focused personality disturbance (Houston et al., 2003; Stanford et al., 2003b).

The sample size, readability of some IPAS items, and ethnic composition of the sample are potential limitations to the generalizability of the current findings. Although the current study tested a relatively small sample ($N = 66$), the results met both of the empirical stability criteria (Guadagnoli and Velicer, 1988), which supports generalizability of the dichotomous IA and

PM factors to the larger population of adolescents with CD. The component saturation and stability index scores provide an empirical test of interpretability of factors for a given sample size, which has been shown to be superior to the traditional theoretical rules for determining adequate sample size (e.g., ratio of sample size to the number of factor items; Guadagnoli and Velicer, 1988). Based on these criteria, the factor structure resulting from the principal components analyses is interpretable for our sample size. Another potential limitation to generalizability was the reading comprehension required of some IPAS items. Words like “altercation” and “justified” may be too difficult for other adolescent samples. In our sample, which had normal range reading comprehension (average WRAT3 Reading standard score = 100), there were no significant associations of reading level (WRAT3) with either IPAS factor score. Given this lack of association and the orderly nature of the results, it appears that item difficulty was not a threat to interpretation of results for the current sample of adolescents with Conduct Disorder; however, caution should be exercised in generalizing these results to other aggressive samples that have impaired reading ability. Finally, our sample reflected the inner city Houston, TX community from which it was selected, which is primarily African American and Hispanic.

The current study validates the IPAS for use in an adolescent sample with CD, and extends research on the characterization of aggression in young children and adults to an adolescent sample prone to disruptive and aggressive behaviors. The findings support the interpretation of two subtypes of aggression (i.e., impulsive and premeditated) among adolescents with Conduct Disorder. The dichotomy of the impulsive and premeditated subtypes of the IPAS may prove to be useful clinically since the type of aggression has differential implications for determining the etiology and treatment of aggressive disorders (Coccaro et al., 1991; Yoshikawa, 1994; Crick and Dodge, 1996; Barratt et al., 1997a; Brown and Partons, 1998; Stanford et al., 2001; Vitaro et al., 2002). Rather than treating adolescents with Conduct Disorder as a homogeneous sample, distinctions between predominantly impulsive and premeditated aggressive groups may allow for more focused basic research, as well as more informed treatment decisions. Further validation of the IPAS would be helpful for interpreting results from other adolescent clinical samples. Ongoing research in this laboratory is addressing this need by examining subtypes of aggression, behavioral performance on objective measures of impulsivity and aggression, and shared relationships with biological and physiological outcomes.

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Principal Components Analysis of the Impulsive/Premeditated Aggression Scales: Current Findings and Previous Publications

Table 1

IPAS Items	PCA Factor Loadings		Kockler et al., 2006	Stanford et al., 2003a
	IA	PM	Factor Loading	Factor Loading
26. I consider the acts to have been impulsive	0.70		0.55 IA	0.77 IA
27. I was in a bad mood the day of the incident	0.70		0.66 IA	*
15. I became agitated or emotionally upset prior to the acts	0.67		0.59 IA	.41 FM
9. I feel I lost control of my temper during the acts	0.62		0.61 IA	0.68 IA
22. I was confused during the acts	0.59		0.65 IA	*
13. I feel some of the incidents went too far	0.57		0.46 IA	0.56 FM
7. I usually can't recall the details of the incidents well	0.50		0.46 IA	0.43 IA
30. Anything could have set me off prior to the incidents	0.50		0.68 IA	0.43 PM
19. I was concerned for my personal safety during the acts	0.50		*	‡
11. I felt pressure from others to commit the acts	0.49			0.43 PM
24. My behavior was too extreme for the level of provocation	0.44		0.60 IA	0.54 IA
28. The acts were a "release" and I felt better afterwards	0.44		0.66 PM	‡
16. The acts led to power over others or improved social status for me	0.43		0.60 PM	0.66 PM
29. I am glad some of the incidents occurred		0.76	0.66 PM	0.68 PM
23. Prior to the incidents I knew an altercation was going to occur		0.68	0.63 PM	0.49 FM
12. I wanted some of the incidents to occur		0.68	0.62 PM	0.68 PM
25. My aggressive outbursts were usually directed at a specific person		0.63	*	0.46 FM
14. I think the other person deserved what happened to them during some of the incidents		0.61	0.66 PM	0.75 PM
20. Some of the acts were attempts at revenge		0.59	0.59 PM	0.60 PM
10. Sometimes I purposely delayed the acts until a later time	5.53	4.41	0.54 PM	0.45 PM
Factor Variance Eigenvalue	18.5	3.33		
Percent Variance		15.6		

NOTE: IA = Impulsive Aggression; PM = Premeditated Aggression; FM = Familiarity with Target/Remorse (3rd Factor for Stanford et al., 2003a, only);

* indicates the item did not load on the IA, PM, or FM (Stanford et al., 2003a, only) factors;

‡ indicates the item was excluded based on item analysis. Items with factor loadings below 0.40 were omitted.

Table II
Measures of Personality or Impaired Functioning and their Relationship to Impulsive and Premeditated Aggression Factors.

Instrument	Omnibus Distribution		IPAS Factor Correlation		IPAS Factor Partial Correlation	
	Mean	(SD)	IA	PM	(IA)	(PM)
Barratt Impulsiveness Scale-11						
Total	76.24	(9.7)	0.39**	0.26*	0.35**	0.18
Eysenck Personality Questionnaire – Junior <i>t</i> -scores						
Neuroticism	47.55	(9.4)	0.54**	0.20	0.52**	0.09
Extraversion	50.27	(12.6)	0.07	-0.04	0.08	-0.06*
Psychoticism	61.19	(11.9)	0.33**	0.43**	0.27*	0.39**
Lie	50.07	(8.8)	-0.16	-0.19	-0.12	-0.15
Buss-Perry Aggression Questionnaire						
Anger	21.06	(5.9)	0.35**	0.43**	0.29*	0.38**
Hostility	23.18	(6.2)	0.47**	0.19	0.44**	0.10
Verbal Aggression	17.24	(4.7)	0.20	0.54**	0.09	0.51**
Physical Aggression	31.09	(6.6)	0.14	0.47**	0.03	0.45**
Youth Self-Report – Syndrome <i>t</i> -scores						
Aggressive Behavior	69.24	(11.0)	0.30*	0.30	0.24	0.24
Rule-Breaking	67.21	(8.1)	0.17	0.22	0.12	0.19
Social Problems	58.95	(8.7)	0.45**	0.21	0.42**	0.12
Thought Problems	59.45	(10.5)	0.46**	0.22	0.43**	0.13
Attention Problems	61.07	(9.6)	0.47**	0.14	0.46**	0.03
Somatic Complaints	59.35	(9.3)	0.51**	0.26*	0.47**	0.15
Anxious/Depressed	58.72	(9.4)	0.41**	0.14	0.39**	0.04
Withdrawn/Depressed	60.97	(9.0)	0.19	0.12	0.16	0.08

NOTE: IPAS Factor correlation coefficients are Pearson product-moment correlations.

IPAS Factor partial correlation coefficients are correlations using a given IPAS Factor score with the opposite IPAS factor partialled out.

IA = Factor 1 - Impulsive Aggression Scale, PM = Factor 2 - Premeditated Aggression Scale.

* correlation significant at 0.05 level (two-tailed);

** correlation significant at 0.01 level (two-tailed)