Disentangling the “whys” from the “whats” of aggressive behaviour

Todd D. Little
University of Kansas, Lawrence, KS, USA

Christopher C. Henrich
Georgia State University, Atlanta, GA, USA

Stephanie M. Jones
Yale University, New Haven, CT, USA

Patricia H. Hawley
University of Kansas, Lawrence, KS, USA

We examined the validity of a measurement system for the study of aggression that distinguishes among four principle dimensions of aggressive behaviour: overt and relational aggression (i.e., the “whats”) and instrumental and reactive aggression (i.e., the “whys”). The sample comprised 1725 adolescents (Grades 5 through 10) from Berlin, Germany. The internal validity of the measurement system was strongly supported, revealing four discrete dimensions of aggression: two overriding forms (overt and relational) and two underlying functions (instrumental and reactive). The differential and unique patterns of criterion-related validity strongly supported the distinctions among the constructs. The importance of disentangling these dimensions in understanding the development of aggressive behaviour is discussed.

Introduction

Although the nature of aggression has been a longstanding concern in psychology (e.g., Coie & Dodge, 1998; Parke & Slaby, 1983), quite different views of the structure of aggressive behaviour continue to dominate research on aggression. These views, however, have spurred relatively orthogonal lines of research and the extant measures have been criticised for aggregating across different forms and dimensions of agonistic behaviour (Archer, 2001; Tremblay, 2000). In this study, we offer an analysis and measurement system that disentangles the general forms and specific functions that aggressive behaviour can take. Our goal is to offer an integrated framework that provides a basis for better understanding of both the aetiology and consequences of aggression in childhood and adolescence.

Various views on aggression

Most contemporary theorists view aggression as a multidimensional construct (Coie & Dodge, 1998; Dodge, 1991; Dodge & Coie, 1987; Frick, 1998; Pulkkinen, 1969, 1996). With a multidimensional view, researchers have differentiated between various forms of aggression (i.e., the “whats” of aggression, including direct, overt, physical, and verbal aggression vs. indirect, relational, social, and material aggression) and different functions of aggression (i.e., the “whys” of aggression, including proactive, offensive, and instrumental aggression vs. reactive and defensive aggression). Despite the fact that the various lines of research offer complementary views on aggression, the different forms and functions of aggressive-antisocial behaviour have not yet been examined and integrated into a unified measurement and analysis system. As a result, the dominant forms and functions of aggressive behaviour have not yet been adequately disaggregated and contrasted. In this study, we examine four broad dimensions of aggressive behaviour that we feel offer an encompassing (albeit non-exhaustive) selection of aggression dimensions in an effort to demonstrate a means by which the forms and functions of aggression can be disentangled empirically.

The “whats” of aggression. Various forms of aggression have been identified in the literature, including direct, physical, verbal, material, relational, indirect, and social aggression. Although debates are ongoing regarding the labelling and conceptual distinctions among the various forms (Archer, 2001; Björkqvist, 2001; Underwood, Galen, & Paquette, 2001), our examination of the literature suggests that most of these dimensions overlap considerably but that at least two higher-order forms can be meaningfully distinguished, which we have chosen to term overt and relational aggression. Overt aggression is generally defined as verbal and physical behaviours that are directed at individuals with the intent to harm them (e.g., pushing, kicking, hitting, threatening, insulting, etc.)—a more direct and “in-your-face” form of aggression (Buss & Perry, 1992; Coie & Dodge, 1998; Parke & Slaby,

Correspondence should be addressed to Todd Little, Schieffelbusch Institute for Lifespan Studies, 1052 Dole, University of Kansas, Lawrence, KS 66045, USA; e-mail: Yhat@KU.edu.

Christopher Henrich is now at the Department of Psychology, Georgia State University, Atlanta, GA. Patricia Hawley is now at the Department of Psychology, University of Kansas, Lawrence, KS 66045.

We would like to express our gratitude for the feedback and comments of our colleagues in the Agency in Development Lab (Todd D. Little, director) of the Department of Psychology at Yale University and to the members of the New England Social Development Consortium (NESDC). Partial support for this work was provided by the Max Planck Society and Yale University. Parts of this work were presented at the biennial meeting of the Society for Research in Adolescence in Chicago, March, 2000 and at the Society for Research in Child Development in Minneapolis, April, 2001.
Relational aggression, on the other hand, is generally defined as acts that are intended to significantly damage another child’s friendships or feeling of inclusion in the peer group (e.g., purposefully withdrawing friendship or group acceptance from a child, ostracism, spreading rumours, gossiping, etc.)—a more indirect and relationship-based form of aggression (Cairns, Neckerman, Ferguson, & Gariépy, 1989; Crick & Grotzter, 1995; Feshbach, 1969).

Even though these two dimensions of aggression are almost always moderately positively correlated, r is generally in the .5 to .7 range (Crick, 1996, 1997; Crick & Grotzter, 1995), numerous studies have supported their distinction (Björkqvist & Niemela, 1992; Loebier & Hay, 1997; Loebier & Stouthamer-Loebier, 1998; Tomada & Schneider, 1997). Validity relationships with criterion-related outcomes further support the distinction between overt and relational forms of aggression. Crick, for example, found independent associations (i.e., after controlling for overt aggression) between relational aggression and indices of social adjustment. Engaging in relationally aggressive behaviour was associated with peer rejection, loneliness, and depression in both genders, and with low prosocial behaviour in girls. In other studies, relational aggression was associated with high levels of exclusivity, intimacy, and the use of relational aggression within friendships, whereas overt aggression was associated with low levels of friendship intimacy and using overt aggression against children outside the friendship group (Grotzter & Crick, 1996).

Gender differences for these two aggression forms have been a central focus. For example, Björkqvist and colleagues have documented that women are more likely to display indirect and relational forms of aggression such as peer ostracism and exclusion than they are to display direct and overt forms of aggression (Björkqvist, Lagerspetz & Kaukiainen, 1992a; Björkqvist & Niemela, 1992). Crick and her colleagues (e.g., Crick, 1995, 1996; Crick & Grotzter, 1995) have also focused on relational vs. overt aspects of aggression and found consistent gender differences. Data from peer nomination instruments, for example, indicate that boys are higher than girls on overt aggression, but girls are higher than boys on relational aggression. However, when self-report measures are used, boys still appear to be higher than girls on overt aggression, but they also appear to be somewhat higher than girls or equal to them on relational aggression (Björkqvist & Niemela, 1992; Crick, 1996, 1997).

A characteristic of this body of research is that the different functions of aggression are not explicitly examined, particularly for measures of relational forms of aggression. As a result, findings such as those regarding gender differences may be confounded by differences in the functional purpose of aggressive acts. In other words, because of the confound between form and function in this body of research, the results and conclusions offered may be compromised.

The "whys" of aggression. Pulkkinnen (1969) distinguished between defensive vs. offensive functional dimensions of aggression that parallel distinctions made more recently by Dodge and colleagues (Dodge, 1991; Dodge & Coie, 1987), who have examined two dominant functions: reactive and proactive (or instrumental) aggression. Reactive aggression is generally defined as aggression that occurs as an angry defensive response to social thwarting (goal blocking) or provocation and includes responses that are primarily inter-

personal and hostile in nature—a definition that stems from the frustration-aggression model (Dollard, Doob, Miller, Mowrer, & Sears, 1939). Instrumental aggression, on the other hand, is generally defined as aggression that occurs in anticipation of self-serving outcomes and is a deliberate behaviour controlled by external reinforcements—a definition that stems from social learning theory formulations of aggression (Bandura, 1973).

Dodge and colleagues (Crick & Dodge, 1994, 1996; Dodge, 1991; Dodge & Coie, 1987; Price & Dodge, 1989) have shown that these functional aspects of aggression are associated with differences in the way antisocial children process social information. This work has shown, for example, that some children have a bias to interpret ambiguous cues as engendering hostile intent. Although this bias is predictive of aggressive behaviour, it is not the goal of our study to assess interpretation biases. Instead, we assess only the "why" of aggressive behaviour regardless of whether the perception of harm or goal-thwarting is accurate or not.

Research on the functions of aggression has consistently shown that the operational measures of these dimensions of aggression are highly correlated (e.g., r = .77, Dodge & Coie, 1987; r = .80, Price & Dodge, 1989; r = .75, Poulin & Boivin, 1999). As with the relational and overt forms of aggression, measures of reactive and instrumental aggression show distinct differential relations with social and psychological adjustment. For example, reactive aggression is associated with peer rejection, externalising symptoms, low self-control, and the tendency to attribute hostile intent in problem-solving situations. Instrumental aggression, on the other hand, is associated with delinquency, criminality, victimisation, social withdrawal, and internalising problems, and in some cases, with positive outcomes such as constructiveness, leadership skills, and social competence (Atkins & Stoff, 1993; Day, Bream, & Pal, 1992; Dodge, Coie, Pettit, & Price, 1990; Dodge, Lochman, Hamish, Bates, & Pettit, 1997; Poulin & Boivin, 1999, 2000; Pulkkinnen, 1996; Vitaro, Gendreau, Tremblay, & Olligny, 1998).

A critical drawback to the research on the functional aspects of aggression is the inherent need to include the form of the aggression in the measures that have been used. In other words, the extant measures typically include the overt act of aggression as part of the item structure when assessing the function of aggression. A prototypical question might read, "I threaten others (overt form) to get what I want (instrumental function)". This confounding overlap could have two possible effects on results and conclusions. First, any predictive relations associated with the functional information would be necessarily attenuated and possibly masked by the form information (i.e., a Type II error). Second, some effects may be due to the form of the aggressive behaviour and not the functional component (i.e., a Type I error). A key strength of our approach to modelling the structure of aggression is that it provides a means to separate form and function so that these inherently confounded effects can be disentangled and clearly interpreted. A precise representation of these two factors would allow us to empirically determine if they are indeed two distinctive and useful dimensions of aggression (cf. Bushman & Anderson, 2001).

An integrated measurement and analysis system

Before detailing our measurement and analysis system, a distinction needs to be made between categorical and dimen-
sional approaches to understanding aggressive behaviour (see, e.g., O'Conner, Archer, & Wu, 2001). Generally speaking, a categorical approach would focus on classifying a given act as aggressive or not and then attempt to characterise the act as overt or relational in form, and possibly instrumental or reactive in function. A dimensional approach, on the other hand, would focus on the individual differences in aggressive behaviour and attempt to characterise individuals as being more or less overt and relational in the forms of their aggressive behaviour as well as more or less instrumental and reactive in the reasons for their aggressive behaviour. We take a dimensional approach in the current study.

In order to disentangle the forms and functions of aggressive behaviour, we designed a self-report protocol that assesses six subscales of aggressive behaviour. We explicitly chose to rely on a self-report format because we were particularly interested in identifying the subjective reasons (i.e., functions) of the aggressive behaviour. That is, we were explicitly intent on examining one's personal perceptions of the "why" of one's aggressive behaviour. With this self-report measure, we assessed 1723 young people (Grades 5 through 10). At this age, one's sense of self is sufficiently developed to be able to make such reports reliably (Kegan, 1982).

Three constructs tap into overt aggression and three tap into relational aggression. Linguistically and logically, we were able to operationalise the two forms of aggression independently from any functional aspects. Thus, two of the six constructs distinguish between the pure forms of aggression (overt and relational) with no reference to function. Regarding the functions of aggression, however, it is not possible to operationalise the why of aggressive behaviour outside of its context (i.e., the context of aggression). That is, logically we could not operationalise items that measure pure function (i.e., function sans form). Therefore, the other four constructs assess a combination of form (overt or relational) with a particular function (reactive or instrumental). However, as shown in Figure 1, this logical limitation of operationalisation does not preclude differentiating form from function empirically. To the best of our knowledge, the instrumental vs. reactive reasons for relational aggression have not been explicitly examined, even though this form of aggression would have an underlying purpose.

Figure 1 presents our theoretical decomposition of the four dimensions of aggression from the six measured constructs. A primary feature of this model is that we employ a multifunction, multifunction decomposition in order to model the four dimensions of aggression. In other words, we uniquely identify the functional nature of aggressive behaviour by controlling for the forms of aggression. A critical feature of the model is that it contains two sources of information for each functional construct. This multiple-source approach allows us to assess the validity of the construct's residual information as part of the basic model (i.e., the residual sources must correlate with one another). The advantage of this approach is that the four primary dimensions of aggression can be identified and uniquely measured given the information contained among the six measured constructs (see Figure 1).

As mentioned, because both overt and relational aggression are overarching, pure forms, they have directly measured indicators. The two functional dimensions of aggression, instrumental and reactive, are second-order constructs (i.e., constructs that do not have manifest indicators) that reflect the variance associated with the underlying and unique functional components controlling for the form. As implied by the model in Figure 1, the variances of the four constructs that consist of both form and function are disentangled into that which is only form, that which is only functional variance, and that which is unique to a given construct (which we expected to be negligible). The validity of this model would be established if the two sources of instrumental aggression (i.e., the residual of overt-instrumental and relational-instrument) are adequately captured by the second-order construct labelled instrumental aggression. Similarly, the two sources of reactive aggression must correlate sufficiently with each other to be captured by

---

**Figure 1.** Structural relations among the forms and functions of aggression. All constructs are measured by multiple indicators except for the higher-order constructs of instrumental and reactive aggression.
the second-order construct labelled reactive aggression. Interpretationally, instrumental aggression reflects the individual differences in the degree to which aggressive behaviour is used to gain some instrumental goal, regardless of whether one's aggressive behaviour is overt or relational in form. Reactive aggression reflects the individual differences in the degree to which one defensively aggresses in response to threat or instigation.

The orthogonality between the forms and the functions of aggression is particularly important because it allows one to examine the psychological correlates of reactive and instrumental aggression fully unconfounded from the overt and relational forms that the aggression might take. Because of this unique orthogonal (independent and unconfounded) nature of the functional constructs, the findings that we report below for reactive and instrumental aggression need not replicate prior research; instead, the findings represent new and novel outcomes about the unconfounded (i.e., form-free) effects of reactive and instrumental aggression.

Hypotheses

1. We expected that the model in Figure 1 would approximate the data from the self-report surveys and the model fit would be sufficient to accept the model over either a six-factor model, a two-factor model, or a three-factor model.

2. On the basis of outcomes in the literature, we expected that overt and relational aggression would be highly positively correlated, perhaps even more so than typically found in the literature, given that unreliability is removed and the functional information is not present.

3. Because of the unique design of our model and because they probably constitute different psychological processes, we expected the functional components to be generally uncorrelated or perhaps even negatively correlated with each other. Although these functional dimensions (reactive vs. instrumental) are operationalised as independent of the forms of aggression (i.e., they are uncorrelated with relational and overt forms), they are not necessarily uncorrelated with each other. The actual degree of correlation is a critical empirical question for this study.

4. We expected the four types of aggression to have differential (and unique) patterns of predictive relations with the selected outcome measures (see below) and that they would show differential patterns of mean-level differences. For example, we expected that boys would show more overt aggression than girls, but that boys and girls would show little or no differences on relational aggression.

Because our measure of aggression relied on self-reports, we selected an encompassing set of other-reported correlates as well as self-reported inventories in order to examine the criterion-related validity relations. As a cross-sectional study, we make no claims about the status of these constructs as causes or outcomes of aggression. To be consistent with the aggression literature (see Coie & Dodge, 1998, for a thorough review), we selected measures that include dimensions of internal self-control (hostility, frustration intolerance), social behaviour (negative social influence, antisocial behaviour), and social experience (social competence, victimisation). Although these measures are not exhaustive of the correlates examined in the literature, they are a representative and reasonably comprehensive selection of them. Our general expectations were that, because the four types of aggression reflect different constellations of psychological and social conditions, (1) we would find differential association across the four dimensions, (2) the differences, generally speaking, would be consistent with findings in the literature, particularly for overt and relational aggression, but (3) the associations would be clear-cut and meaningful (unequivocal) because of the unconfounded measurement of the aggression dimensions.

By way of illustration, we expected that frustration intolerance would be positively related to overt, relational, and reactive aggression but unrelated or negatively related to instrumental aggression. On the other hand, we expected the use of coercive social strategies (negative social influence) to be positively related to overt, relational, and instrumental aggression but unrelated or negatively related to reactive aggression. We also expected some differential relations across the different raters' perspectives. For example, although we expected self-reported social competence to be negatively related to both overt and relational aggression, we expected peer perceptions of antisocial behaviour to be positively related to overt aggression but unrelated to relational aggression. Similarly, we expect differences in the degree to which instrumental aggression would correlate with the negative influence measures when rated by the self (strong positive correlations) versus peers (zero or very weak correlation).

Methods

Participants

Participants were selected from each of the primary school types (e.g., college-bound, trade-bound, comprehensive) in a lower- to upper-middle-class suburb of Berlin, Germany. In total, 1,723 students (with written parental permission) in Grades 5 (mean age 11.2) through 10 (mean age 16.2) participated, reflecting over 75% active-consent participation (females = 910). The sample was roughly 82% ethnic German, 12% ethnic Turkish, and 6% other. Supplemental analyses showed no systematic differences by school type on the constructs and therefore the data were collapsed across these groups. Ethnicity, gender, age-cohort, and their interactions were included and examined in all analyses. We did not have specific expectations regarding the Turkish minority because very little literature is available on their status within German society, particularly after reunification.

Procedure

Data for this study were collected as part of a broader project. A large battery of questionnaires was administered to participating students in groups of approximately 30 per class during three 45-minute sessions over the course of approximately 2 weeks. For the 5th- and 6th-grade participants, a proctor read the questions aloud while a second proctor assisted the children. Participants in the upper grades completed the questionnaires independently while a proctor circulated to answer any questions that arose. Orders were counterbalanced.
Table 1

Items used to assess the dimensions of overt aggression

"Pure" overt aggression ($r_{xx} = .79$)
I'm the kind of person who often fights with others.
I'm the kind of person who hits, kicks, or punches others.
I'm the kind of person who says mean things to others.
I'm the kind of person who puts others down.
I'm the kind of person who threatens others.
I'm the kind of person who takes things from others.

Reactive overt aggression ($r_{xx} = .82$)
When I'm hurt by someone, I often fight back.
When I'm threatened by someone, I often threaten back.
When I'm hurt by others, I often get back at them by saying mean things to them.
If others make me upset or hurt me, I often put them down.
If others have angered me, I often hit, kick or punch them.
If others make me mad or upset, I often hurt them.

Instrumental overt aggression ($r_{xx} = .84$)
I often start fights to get what I want.
I often threaten others to get what I want.
I often hit, kick, or punch others to get what I want.
To get what I want, I often put others down.
To get what I want, I often say mean things to others.
To get what I want, I often hurt others.

Table 2

Items used to assess the dimensions of relational aggression

"Pure" relational aggression ($r_{xx} = .62$)
I'm the kind of person who tells my friends to stop liking someone.
I'm the kind of person who tells others I won't be their friend anymore.
I'm the kind of person who keeps others from being in my group of friends.
I'm the kind of person who says mean things about others.
I'm the kind of person who ignores others or stops talking to them.
I'm the kind of person who gossips or spreads rumours.

Reactive relational aggression ($r_{xx} = .63$)
If others upset or hurt me, I often tell my friends to stop liking them.
If others have threatened me, I often say mean things about them.
If others have hurt me, I often keep them from being in my group of friends.
When I am angry at others, I often tell them I won't be their friend anymore.
When I am upset with others, I often ignore or stop talking to them.
When I am mad at others, I often gossip or spread rumours about them.

Instrumental relational aggression ($r_{xx} = .78$)
I often tell my friends to stop liking someone to get what I want.
I often say mean things about others to my friends to get what I want.
I often keep others from being in my group of friends to get what I want.
To get what I want, I often tell others I won't be their friend anymore.
To get what I want, I often ignore or stop talking to others.
To get what I want, I often gossip or spread rumours about others.

Measures

The aggression constructs were assessed with a 36-item self-report instrument designed to differentiate both the underlying forms and the functional expressions of aggression—pure overt aggression, overt-reactive aggression, and overt-instrumental aggression (see Table 1) as well as pure relational aggression, relational-reactive aggression, and relational-instrumental aggression (see Table 2). The items for these six scales were adapted from measures used by Crick and colleagues to assess relational and overt aggression (e.g., Crick & Grooten, 1995) and measures used by Dodge and colleagues to assess reactive and instrumental aggression (e.g., Dodge & Coie, 1987). Participants rated how true each item was for them on a 4-point scale from "not at all true" to "completely true". The scales showed acceptable internal consistency (see Tables 1 and 2) to be used in structural equation modelling (SEM) techniques (Little, Lindenberger, & Nesselroade, 1999).

As correlates, we used various self-report and other-report measures including frustration intolerance, hostility, victimisation, social influence, and social competence. Frustration intolerance assesses the ease with which individuals get angry or upset while hostility assesses the tendency to provoke others such as through teasing and frightening (based on scales from Jackson, 1968; Seitz & Rausche, 1992). Victimisation assesses the extent to which individuals view themselves as victims of aggression by their peers (from Graham, 1998). For social influence we asked participants about the extent to which they use coercive strategies to influence their peers (based on Hawley, Little, & Pasupathi, 2002). Social competence assesses individuals' perceptions of their competence in peer relationships (from Harter, 1982). All scales consist of six items rated on a 4-point scale from "not at all true" to "completely true".

The other-report versions of these constructs were assessed using sociometric procedures, except for the hostility dimension, which was rated by a close friend. For each sociometric item, participants were asked to nominate up to three students from their grade. For frustration intolerance, "who gets upset or angry easily?"; for victimisation, "who gets picked on by others?" and "who gets beat up by others?"; for negative influence, "who forces others to follow their plans?" and "who makes others do what they want?"; for antisocial behaviour, "who is mean to others?" and "who is the least helpful to others?".

All measures were adapted and translated into both English and German by a committee of bilingual experts. Table 3 provides descriptive statistics and internal consistencies for the correlates. A series of preliminary SEM analyses validated the measurement structure of each construct. All items evinced consistent patterns of convergent and discriminant validity, indicating content-valid and unidimensional item pools for each construct. As a result of these favourable analyses we were justified in using parcelled indicators in the analyses. Parcelling involves randomly (without replacement) averaging two of the six items per construct, yielding an ideal just-identifiable measurement structure of three indicators for each construct. Parcels are preferred for our broad-based SEM analyses because, compared to items, parcels have superior psychometric qualities that reduce both Type I and Type II sources of error but do not bias or otherwise inflate construct relations (for details see Little et al., 1999; Little, Shahar, Cunningham, & Widaman, 2002).
Table 3
Descriptive statistics for the outcome measures

| Outcome variable | Gender | | | Ethnicity | | | |
| | | Males | | | Majority | | | Minority | | | Grade | | |
| | | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Grade | r_e |
| Hostility | Self-rated | 1.96 | 0.65 | 1.83 | 0.64 | 1.88 | 0.63 | 1.93 | 0.68 | -0.06 | .69 |
| | Other-rated (friend) | 2.04 | 0.49 | 1.95 | 0.47 | 1.98 | 0.48 | 2.04 | 0.50 | .04 | .70 |
| Frustration intolerance | Self-rated | 2.22 | 0.69 | 2.22 | 0.72 | 2.20 | 0.69 | 2.32 | 0.79 | .05 | .83 |
| | Other-rated (peer)^b | 0.12 | 1.05 | -0.11 | 0.86 | -0.02 | 0.95 | 0.10 | 0.99 | .00 | .80 |
| Victimization | Self-rated | 1.54 | 0.58 | 1.45 | 0.59 | 1.50 | 0.59 | 1.45 | 0.58 | -0.25 | .94 |
| | Other-rated (peer)^b | 0.16 | 1.04 | -0.14 | 0.74 | 0.02 | 0.93 | -0.08 | 0.77 | .00 | .86 |
| Negative influence | Self-rated | 1.64 | 0.43 | 1.51 | 0.37 | 1.55 | 0.38 | 1.67 | 0.47 | .10 | .77 |
| | Other-rated (peer)^b | 0.14 | 1.04 | -0.13 | 0.75 | -0.05 | 0.86 | 0.23 | 1.08 | .00 | .88 |
| Social competence | Self-rated | 3.22 | 0.52 | 3.25 | 0.55 | 3.24 | 0.52 | 3.22 | 0.58 | .12 | .75 |
| Antisocial behaviour | Other-rated (peer)^b | 0.21 | 1.00 | -0.19 | 0.63 | -0.02 | 0.83 | 0.10 | 0.93 | .00 | .70 |

^a Scores based on 4-point scales, except the peer-nominated variables. Samples sizes for males = 813, females = 910, majority = 1423, minority = 300. Correlations with grade at .05 and higher are significant. r_e is the internal consistency estimate. The correlations between an other-rated vs. self-rated construct never exceeded .34; the average variance overlapping among all outcome constructs was less than 10%. Only peer-rated antisocial behavior and peer-rated negative influence reached the 50% overlap level.

^b Because the sociometric variables are based on peer nominations they were standardised within the classroom.

For the analytic procedures, we used either standard SEM analyses or mean and covariance structures (MACS; Little, 1997) modelling techniques. MACS analyses are used for multiple-group comparisons and include mean-level information as well as the covariance structures information of SEM—they also carry with them all the inherent advantages of SEM (see, e.g., Jöreskog & Sörbom, 1993). We evaluated model fit using standard fit indices: the Non-Normed Fit Index (NNFI) and the Incremental Fit Index (IFI), for which values of about .90 and greater are generally deemed acceptable, and the Root Mean Square Error of Approximation (RMSEA), for which values of less than .08 are deemed acceptable. The maximum likelihood chi-squared statistic was also used, but only for strict nested-model comparisons. Because the statistic is extremely sensitive with large sample sizes, we used a p-value of .01 for all nested-model comparisons.

Results

Internal validity
The hypothesised model showed quite sound goodness of fit, \( \chi^2(129, N = 1723) = 932.00 \); RMSEA = .061; NNFI = .946; IFI = .955. The hypothesised model showed no differences in fit, \( \Delta \chi^2(13, N = 1723) = 25.9, n.s. \), in comparison to the less parsimonious six-factor model (e.g., only the six measured constructs without the restrictions of the second-order disentangling). In addition, a two-factor model (i.e., two forms only) was also an inferior representation of the data, showing significantly worse fit than the hypothesised model, \( \Delta \chi^2(9, N = 1723) = 73.8, p < .01 \). Finally, a three-factor model (overt and relational combined as one factor) also fit significantly worse than the hypothesised model, \( \Delta \chi^2(1, N = 1723) = 12.5, p < .01 \). The loadings (validity coefficients) in this model were uniformly strong and significant (all ps < .01; average variance explained in the manifest indicators was 58%). Moreover, examination of the modification indices and residuals, as well as the parameters and their standard errors, indicated that no further estimates would improve the fit of the model. In other words, our hypothesised model approximated the data quite well and better than these alternative models.

Substantively, we found that overt and relational aggression, although differentiated constructs, were highly correlated in our sample with 69% of the reliable variance shared (disattenuated \( r = .83 \), but significantly less than 1.0, i.e., \( \Delta \chi^2(1, N = 1723) = 12.5, p < .01 \)). The correlation is higher than found in the literature because SEM procedures control for unreliability and, too, possibly because our measures of overt and relational aggression do not involve functional sources of variance. As expected, instrumental and reactive aggression were trivially correlated with each other (disattenuated \( r = -.10, p < .05 \)). Note that this lack of correlation was the same within the two overt components and the two relational components. Also note that, by definition, the two functional dimensions are independent of the overt and relational nature of the aggression.

To further assess the generalisability of the measure, we
evaluated its fit across age cohort (Grades 5–7 vs. Grades 8–10), gender, and ethnicity (majority vs. minority). The measurement equivalence of the model was well supported, Δχ²(152, N = 1723) = 323.4; ΔRMSEA = .004; ΔNNFI = .008; ΔIFI = .022 (see Little, 1997, for details on conducting this type of test). We also found no differences (i.e., as main-effect or interaction) in the latent correlations across the groups, χ²(14, N = 1723) = 22.1, n.s. The essential equivalence in the fit of the model indicates that both the measurement properties and the structural dynamics (inter-correlations) of the aggression constructs are equivalent (i.e., fully generalisable) across age cohort, gender, and ethnicity.

Taken as a whole, all these findings strongly support the internal validity of the model.

**External validity**

*Gender, ethnicity, and age-cohort differences.* Although the covariance relations were equivalent across groups, the mean levels of the constructs varied. These main effects and interactions for age cohort, ethnicity, and gender on the different dimensions of aggression are presented as latent regression weights in Table 4. Before turning to these effects, keep in mind that the functional constructs (reactive and instrumental) are unconfounded form-free dimensions and that any relationships with these effects are therefore new and novel outcomes for the literature on aggression.

We found gender differences on all of the constructs wherein males reported greater aggression than females. The magnitude of the difference was lowest for reactive aggression. Developmentally, the constructs showed generally stable patterns with one interaction. Specifically, females showed a steady decline in relational aggression across Grades 5–10 whereas the males showed stable levels of relational aggression (see Table 4). The pattern of differences by ethnicity generally indicated that the minority group (primarily Turkish) reported more overt, relational, and reactive aggression. However, no differences emerged for instrumental aggression. The ethnicity by age interaction that emerged for reactive aggression revealed that minority individuals remained relatively stable in the amount of reactive aggression and that the age-related decline is primarily a characteristic of the ethnic majority in this sample.

**Criterion validity.** To test the criterion validity of the four types of aggression, we examined their relations with a series of correlates, controlling for age cohort, gender, and ethnicity. To do so, we estimated latent regressions of the correlates onto relational, overt, reactive, and instrumental aggression (see Table 5). As simultaneous regressions, the parameters represent the unique contribution to the predicted variance in the outcome measures by each type of aggression, controlling for all other types of aggression (for comparative purposes the simple Pearson correlations are presented in Appendix A). Overall, the results showed that the different types of aggression have mostly differentiated patterns of relationships with the outcome variables, supporting the criterion validity of the constructs represented in the model.

The latent regressions explained 55% of the variance in hostility (see Table 5). Overt, relational, and reactive aggression had strong positive effects (β = .41, .32, and .26, respectively), and the strength of the effect for overt aggression was stronger than for reactive aggression (z = 2.66, p < .01), suggesting that a hostile style of peer interactions is associated with all types of aggression with the exception of instrumental aggression and that it is more strongly associated with overt aggression than with reactive aggression.

A similar but distinctive pattern was found for frustration intolerance. With 46% of the reliable variance explained, overt, relational, and reactive aggression also had strong positive effects (β = .31, .22, and .44, respectively), but here, the effect for reactive aggression was significantly greater than for overt (z = 1.97, p < .05) and relational aggression (z = 2.81, p < .01). The unique contribution of instrumental aggression was negative and significant, although of small magnitude (β = −.06). This pattern indicates that all forms of aggression are associated with ease of frustration, particularly reactive aggression—the negative relation with instrumental aggression suggests that it is a more emotionally regulated and planful expression of aggression than the other types.

The regressions explained 10% of the variance in self-reported victimisation. Relational aggression contributed positively (β = .40) while overt aggression had a slightly negative association (β = −.10), indicating that victimised adolescents are more likely to use relational forms of aggression, perhaps because they lack the ability or motivation to use overt forms of aggression.

---

**Table 4**

Unique effects of demographic variables on the aggression constructs

<table>
<thead>
<tr>
<th>Demographic variable</th>
<th>Forms of aggression</th>
<th>Functions of aggression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overt</td>
<td>Relational</td>
</tr>
<tr>
<td>Gender</td>
<td>−.16**</td>
<td>−.10**</td>
</tr>
<tr>
<td>Age</td>
<td>.02</td>
<td>−.07*</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>.07**</td>
<td>.06*</td>
</tr>
<tr>
<td>Gender*Age</td>
<td>.00</td>
<td>−.07*</td>
</tr>
<tr>
<td>Gender*Ethnicity</td>
<td>.03</td>
<td>.03</td>
</tr>
<tr>
<td>Ethnicity*Age</td>
<td>.00</td>
<td>.01</td>
</tr>
<tr>
<td>Gender<em>Age</em>Ethnicity</td>
<td>−.02</td>
<td>−.01</td>
</tr>
</tbody>
</table>

*The tabled values are standardised latent regression estimates, estimated simultaneously (i.e., controlling for the all other effects, thus each demographic effect is unique).

For gender, females were coded higher; for ethnicity, the Turkish minority was coded higher. The two forms of aggression are independent of the two functions of aggression.

*p < .05; **p < .01.
The aggression constructs explained 65% of the variance in negative influence. All types of aggression contributed significantly, but with varying magnitude. As expected, the estimates for overt and instrumental aggression were large (β = .50 and .44, respectively), and the effects for relational and reactive aggression were much more modest (β = .15 and .12, respectively). This pattern suggests that domineering adolescents often resort to overt forms of aggression, which are quite planful and calculating (i.e., instrumental) in function.

The aggression constructs predicted 7% of the variance in social competence. Relational aggression contributed negatively (β = -.25) and reactive aggression contributed positively (β = .12). The pattern for relational aggression suggests that socially competent adolescents appreciate the negative social consequences of being relationally aggressive and they resort to aggression only when provoked, as suggested by the positive relation with reactive aggression.

The other-reported variables also demonstrated differential relations with the four types of aggression. Although the relationships for peer reports were not as strong as for self-reports, the differential patterns of relationships were consistent.

With 18% of the variance in friend-rated hostility toward others explained, all four of the self-reported aggression constructs had positive influences (see Table 5). Notably, the strongest effect was for reactive aggression, which would be consistent with a fundamental attribution bias; namely that friends view a child’s behaviour as a hostile trait-like characteristic whereas the adolescent views his or her behaviour as a reactive response to provocation. In a similar manner, the aggression constructs explained 7% of the variance in peer-reported frustration intolerance. Both overt and reactive aggression had positive associations (β = .24 and .11, respectively), and instrumental aggression was negative (β = -.08). Only relational aggression, which was slightly negative (β = -.08) but nonsignificant, differed across the two reporters’ perspectives, suggesting that peers do not perceive relationally aggressive acts as exemplary of frustration.

The aggression constructs explained 15% of the variance in peer-rated negative influence. Both overt and reactive aggression were positively associated with negative influence (β = .37 and .15, respectively) and relational aggression was negatively related (β = -.15). Interestingly, no relationship was found for instrumental aggression. The dramatic difference between the self-reports and peer reports of negative influence suggests that peers do not perceive the degree to which a child’s coercive style is instrumentally motivated. Finally, 15% of the variance in antisocial behaviour was explained. Overt (β = .28) and reactive (β = .12) aggression had positive effects, but relational and instrumental aggression were unrelated (see Table 5). Supplemental analyses of possible gender differences in the strengths of these predictive correlates revealed no significant differences.
Discussion

The central strength of this study was that the various forms and functions of aggression were examined together in an integrated measurement and analysis framework. This framework allowed us to disentangle empirically four primary dimensions of aggression and, thereby, examine their differential predictive relations with various criterion-related correlates. Both the internal and external validity results strongly supported the multidimensional distinctions that have been made among the dominant forms and functions of aggression. Below, we discuss the implications of these distinctions for theories of aggression and we highlight a number of issues and implications that follow from our integrated measurement and analysis framework.

Issues and implications for theories of aggression

The novel and theoretically most meaningful outcome of the analyses was the essential independence of reactive and instrumental aggression. Because of the unique way of measuring and modelling these two functional aspects of aggression, we were able to represent the functional information independent of the form. In the current literature, the strong positive correlations typically found between measures of reactive and instrumental aggression have been based on constructs that also contain common form variance (e.g., Dodge & Coie, 1987; Poulin & Bovin, 1999, 2000; Price & Dodge, 1989). On the basis of our analyses, the magnitude of this commonly found correlation is most likely to be a measurement artifact that is primarily attributable to the common element of the overt nature of the aggression. As mentioned, measures of instrumental aggression also contain, of necessity, the overt or relational form of aggression (i.e., its context). As our study has shown, the inherent confound can be removed by additionally measuring the overt or relational form of the aggression as a pure dimension. Partialling the variance associated with the pure form of the aggression allows one to represent the functional information (i.e., the reasons, or “whys”) of aggressive behaviour as unconfounded information. When such a measurement and analysis system is employed, reactive and instrumental aggression are uncorrelated with each other.

The lack of correlation between reactive and instrumental aggression indicates that the psychological complexion of the two functional aspects of aggression is also orthogonal. Reactive aggression appears to be a response to provocation exhibited by competent individuals (social competence) that is related to deficits in emotion regulation (frustration intolerance); moreover, peers appear to view such reactive outbursts as indicative of mean and unhelpful intent (antisocial behaviour) coupled with a hostile disposition (hostility). In a completely different psychological world, instrumental aggression appears to capture planful acts associated with self-serving strategies of social control (negative influence) for which a degree of social skill is required (social competence). The independence of these constructs, we believe, answers the question posed by Bushman and Anderson (2001) with a clear no—it is not time to pull the plug on this distinction. Rather, we should focus even greater efforts on examining the unique and differential nature of this distinction.

Regarding the forms of aggression, we generally replicated the finding that overt and relational aggression are highly correlated yet distinct aspects of aggression. Although 69% of the reliable variance in the two forms of aggression overlaps, 31% of the reliable variance does not. Despite this high degree of overlap, however, overt and relational aggression did show distinctly differential patterns of relations, with the correlates indicating that the psychological implications of the two forms of aggression are distinct. On the other hand, the high degree of overlap also suggests that aggressive adolescents will resort to what ever means of aggression are available and effective. For those who feel they are victimised, for example, relational aggression appears to be the available means. For those who would control the material and social resources of their peer world, overt aggression appears to be the effective means of choice. Surprisingly, both instrumental and reactive aggression were unrelated to perceived victimisation and they were negatively related to peer nominations of victimisation. This pattern suggests that highly victimised children have a rather subordinate status in the peer group.

We did not find a gender difference favouring girls on relational aggression. Instead, we found a modest difference in reported usage of relational aggression favouring boys. Although Crick (1996, 1997; Crick & Grot Peters, 1995) has found consistent gender differences with peer reports of aggression, the findings for self-report measures are more mixed (cf. Cairns et al., 1989). A likely reason for these findings is that the subjective criterion for self-describing one’s behaviour as relationally aggressive may be less pronounced in males than in females, for whom sensitivity to relationships issues appears to be socialised to a greater degree than for males. At least three features of our study may also have contributed to this gender difference. First, because our sample is generally older than the elementary-aged samples of Crick and colleagues, the gender differences favouring boys may reflect a developmental change in adolescence. Second, our sample was drawn from a cultural context (Germany) where social regulation among individuals is a relatively common practice for both males and females. Such social institutions may allow males to more freely utilise relationships as a means of social control. Third, our measures of overt and relational aggression are measured without error (i.e., they are latent constructs) and without the contamination of the functional aspects of the aggression. This purity of measurement may eliminate a source of variance that has contributed to the inconsistent gender differences commonly found in the literature. The question of which of these interpretations is correct will require further studies across differing sociocultural contexts.

Developmental issues and implications

Although the results of our study are very encouraging for the goals that we set out to accomplish, a number of developmental issues remain. First, the cross-sectional age-related trends found in our data are limited. Of particular interest to us would be an intensive longitudinal study that would allow a focus on both the contextual influences and the intra-individual stability of these forms and functions of aggression, as well as broaden the age span. We would expect that relational forms of aggression would be most pronounced in contexts where some continuity of peer associations has been established. For example, one might find more relational aggression at the end of an academic year than at the beginning of a school year and one might find drops in relational
aggression after a pronounced transition such as changing to a new school context. Similarly, we might expect more variability in reactive aggression over time under the assumption that the eliciting cues to reactive aggression are variable over time. Here, one could follow the dynamic patterns of relations between cues and reactions over time.

In a similar vein, a longitudinal investigation would allow one to examine the dynamic interplay among the aggression constructs, particularly between overt and relational forms of aggression. Given that these two forms of aggression are correlated but unique aspects of aggression, a fine-grained longitudinal analysis would be able to determine the degree to which increases or decreases in one form of aggression are associated with changes in the other. The various possible patterns of contemporaneous association as well as lagged association would reveal tremendous amounts of information about the levels and dynamics of the aggression system (Patterson, 1982; Patterson, Reid, & Dishion, 1992).

Björkqvist, Österman, and Kaukiainen (1992b) offered a developmental hypothesis that physical forms of aggression emerge first in young childhood, followed by verbal forms, which then give rise to indirect (relational) modes of aggression. Given that aggression can be viewed as an evolutionarily adaptive social strategy (Archer, 2001; Hawley, 1999), the instrumental use of aggression may in fact develop very early and be evident even in toddlerhood. It might also be that instrumental use of aggression may be a marker of which children develop indirect modes of aggression. Moreover, the long-term developmental outcomes of instrumentally aggressive young people may be enhanced (or at least not undermined) by the planful and measured use of aggressive strategies.

Methodological issues and implications

At least three methodological issues deserve mention. First, the two forms of aggression that we assessed are overriding dimensions that could be broken down even further if needed. For example, the distinctions between physical and verbal forms of aggression could possibly be differentiated by including more items of each type. Similarly the distinction between direct vs. indirect relational aggression could possibly be differentiated by the inclusion of more items with clear operational distinctions. Admittedly, the instantiations of the aggression constructs used in this study did not contain sufficient items to empirically differentiate these more fine-grained distinctions. A second methodological issue relates to other more classical techniques that can be used to make these empirical decompositions possible. Our SEM approach provided the strong validity justification of the disentangling process. With the validity established, one could choose to perform the disentangling with standard regression techniques, which would allow one to use the unconfounded scores on instrumental or reactive aggression for any other type of analysis that may be desired (e.g., cluster analysis). A final issue is related to the fact that we included only two functional (instrumental and reactive) reasons for aggressive behaviour. If a researcher so desired, our general approach could be expanded to include other functions of interest.

Conclusion

Our study provides strong validity support for a measurement and analysis system that allows one to disentangle empirically the “whys” from the “whats” of aggressive behaviour. In our view, our unified measurement and analysis approach, because it allows unconfounded differentiations among the forms and functions of aggression, has great potential to facilitate future attempts to address the challenges of understanding the causes and consequences of aggressive behaviour (see e.g., Tremblay, 2000; Underwood et al., 2001).

References


Appendix A

*Pearson correlations between aggression constructs and correlates controlling for gender, grade, and ethnicity*

<table>
<thead>
<tr>
<th>Outcome variable</th>
<th>Forms of aggression</th>
<th>Functions of aggression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overt</td>
<td>Relational</td>
</tr>
<tr>
<td><strong>Hostility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-rated</td>
<td>.53**</td>
<td>.44**</td>
</tr>
<tr>
<td>Other-rated (friend)</td>
<td>.24*</td>
<td>.22**</td>
</tr>
<tr>
<td><strong>Frustration intolerance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-rated</td>
<td>.40**</td>
<td>.38**</td>
</tr>
<tr>
<td>Other-rated (peer)</td>
<td>.16**</td>
<td>.09**</td>
</tr>
<tr>
<td><strong>Victimisation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-rated</td>
<td>-.22**</td>
<td>.21**</td>
</tr>
<tr>
<td>Other-rated (peer)</td>
<td>.08**</td>
<td>.01</td>
</tr>
<tr>
<td><strong>Negative influence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-rated</td>
<td>.48**</td>
<td>.44**</td>
</tr>
<tr>
<td>Other-rated (peer)</td>
<td>.27**</td>
<td>.15**</td>
</tr>
<tr>
<td><strong>Social competence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-rated</td>
<td>-.16**</td>
<td>-.25**</td>
</tr>
<tr>
<td>Other-rated (peer)</td>
<td>.19**</td>
<td>.15**</td>
</tr>
</tbody>
</table>

* *p < .05; **p < .01.