Positively Biased Self-Perceptions of Peer Acceptance and Subtypes of Aggression in Children

Rebecca J. Lynch[1,*], **Janet A. Kistner**[1], **Haley F. Stephens**[1], and **Corinne David-Ferdon**[2]

Florida State University

Abstract

There is a growing body of research linking children's positively biased self-perceptions with higher levels of aggression. This study extended this area of research by examining prospective associations of positively biased self-perceptions of peer acceptance with overt and relational aggression. In addition, moderating effects of peer rejection were examined to test the "disputed overestimation hypothesis," which posits that the link between bias and aggression is limited to children who are rejected by their peers. Using a two-wave longitudinal design, measures of peer-rated and self-perceived peer acceptance and peer-rated overt and relational aggression were obtained for 712 children in 3rd through 5th grades (386 girls and 326 boys). Positively biased perceptions led to increases in relational, but not overt, aggression. This pattern was observed even when the effects of gender, race, peer rejection, and overt aggression on relational aggression were controlled. Contrary to the disputed overestimation hypothesis, the prospective associations between bias and aggression did not vary as a function of children's peer rejection status, thus supporting the view that positive bias predicts future aggressive behavior, regardless of social status. The results are discussed in terms of the comparability with previous findings and practical implications.

Childhood aggression is linked with a number of negative psychosocial outcomes including social rejection, school dropout, delinquency, and adult antisocial behavior (Cairns, Cairns, & Neckerman, 1989; Parker & Asher, 1987). Understanding the multiple factors that contribute to aggressive behavior is critical to development of effective interventions. One promising area of research on aggression investigates the role that overly positive self-perceptions may play in the development and display of aggressive behavior. According to the "threatened egotism hypothesis" (Baumeister, Smart, & Boden, 1996), aggression is elicited in situations in which one's positive self-perceptions, particularly "inflated" self-perceptions (i.e. self-perceptions that are highly favorable, grandiose, or unjustifiably positive), are challenged by an external evaluation that is less favorable than one's own. There is considerable support for this hypothesis in explaining aggression among adults (e.g., Bushman & Baumeister, 1998; Penney & Spector, 2002) and a growing body of

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*Correspondence concerning this article should be addressed to Rebecca J. Lynch, Department of Psychology, Florida State University, 1107 West Call Street, Tallahassee, FL 32306-4301. lynch@psy.fsu.edu.
[1]Department of Psychology, Florida State University
[2]Division of Violence Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia.

research within the peer relations domain suggests that this hypothesis may also apply to childhood aggression (e.g., David & Kistner, 2000; Orobio de Castro, Brendgen, Van Boxtel, Vitaro, & Schaepers, 2007).

Studies investigating the link between overly positive self-perceptions and risk for aggression in children have primarily focused on perceptions of their acceptance by peers, typically indexed by discrepancies between children's perceived peer acceptance and objective indicators (e.g., peer, teacher or parent ratings) with positive scores reflecting positive bias. There is considerable evidence showing that children with positively biased social self-perceptions are more aggressive than peers with more realistic self-perceptions (e.g., Edens, Cavell, & Hughes, 1999; Hymel, Bowker, & Woody, 1993; McQuade, Achufusi, Shoulberg, & Murray-Close, 2014; Orobio de Castro et al., 2007; Patterson, Kupersmidt, & Griesler, 1990; Sandstrom & Herlan, 2007). In addition, an experimental study found that manipulation of negative social feedback led to negative mood (including anger) in children with positively biased self-perceptions (Thomaes, Orobio de Castro, & Bushman, 2009). Although aggression was not directly assessed in their study, the findings support the view that children with positively biased self-perceptions are likely to experience more negative emotional reactivity when confronted with negative social feedback than children with accurate self-views. Taken together, these studies suggest that postive bias is a causal risk for children's aggression, but a number of questions and issues pertaining to this area of research warrant further study.

One gap in this area of research is the implications of positively biased self-perceptions for predicting relational aggression. Most prior research has focused on overt aggression (i.e., behavior that causes harm to others through physical acts such as hitting and/or verbal threats such as calling names: e.g. Diamantopoulou, Rydell, & Henricsson, 2008; Hughes, Cavell, & Grossman, 1997) with little attention to relational aggression (for exceptions, see David & Kistner, 2000; McQuade et al., 2014; Sandstrom & Herlan, 2007). Relational aggression refers to inflicting harm by damaging relationships with others (e.g., spreading rumors, peer exclusion: Crick, Bigbee, & Howes, 1996; Crick & Grotpeter, 1995). Relational aggression is associated with serious social-psychological adjustment problems for both aggressors (e.g., internalizing problems, borderline personality features, eating pathology, peer rejection: Card, Stucky, Sawalani, & Little, 2008; Crick, 1996; Crick, Ostrov, & Werner, 2006; Grotpeter & Crick, 1996) and victims (e.g., peer rejection, depression, anxiety, loneliness, and impulsivity: Crick & Bigbee, 1998; Crick & Grotpeter, 1996; Crick & Nelson, 2002; Paquette & Underwood, 1999; Schafer, Werner, & Crick, 2002). Although overt and relational aggression are often highly correlated (e.g., Cillessen & Mayeux, 2004; Crick & Grotpeter, 1995; Crick, Ostrov, & Kawabata, 2007; Tomada & Schneider, 1997), factor-analytic studies have supported the distinctiveness of relational forms of aggression from overt forms (e.g., Crick & Grotpeter, 1995). Further, several studies have shown that they are differentially related to different precursors, correlates, and psychosocial outcomes (e.g., Crick et al., 2006; Preddy & Fite, 2012; Spieker et al., 2012). The importance of examining relational aggression is further supported by literature suggesting gender differences in aggression (e.g., Crick, 1996; Crick & Grotpeter, 1995; Prinstein, Boergers, & Vernberg, 2001).

There are several reasons for extending research on positively biased social self-perceptions to the prediction of relational aggression. As previously noted, relational aggression is a pernicious problem that is associated with negative developmental outcomes for the aggressors as well as their victims. As such, understanding the factors that contribute to this type of aggression is critical. Causal risk factors of relational aggression may or may not be the same as those that lead to overt aggression. Extending research of positive bias to relational aggression has the potential to further our understanding of the factors that contribute to this type of aggression. According to the threatened egotism model, aggression is elicited when individuals are confronted with feedback that is at odds with their inflated self-perceptions (Baumeister et al., 1996). In the domain of peer acceptance, negative feedback is likely to bear strong resemblance to acts of relational aggression (e.g., exclusion from social events and interactions). Theories of aggression posit that individuals retaliate to perceived aggression with similar forms of aggression (e.g., Crick & Dodge, 1994). Empirical research supports this predicted association between provocation type (overt vs. relational) and the form of aggressive behavioral response (overt vs. relational). For example, researchers have found that children tend to respond to perceived relationship-oriented threats with acts of relational aggression (e.g., Crick, Grotpeter, & Bigbee, 2002; Yeung & Leadbeater, 2007). Thus, it seems reasonable to predict that children with overly positive perceptions of peer acceptance would be especially likely to react to negative social feedback with efforts to damage the peer relationships of their peers (i.e., relational aggression) in an effort to maintain their positive bias and/or retaliate for their own lack of success in those peer relations. Extending this line of research to relational aggression also has the potential to advance our understanding aggressive behavior patterns in girls, who are more likely to exhibit relational than overt aggression (e.g., Apter & Josselson, 1998; Crick, 1997; Moffitt & Caspi, 2001; Putallaz et al., 2007).

Another question that has received relatively little attention is whether bias predicts increases in aggression as would be expected of a causal risk factor. Most evidence in support of bias as a risk factor for children's aggression is based on studies of concurrent associations between bias and aggression. Finding that bias predicts increases in aggression over time would bolster support for the hypothesis that positive bias is a causal risk factor of aggression. To date, only a handful of studies have examined prospective links between positively biased self-perceptions and aggression in children (Brendgen, Vitaro, Turgeon, Poulin, & Wanner, 2004; Hoza, Murray-Close, Arnold, Hinshaw, & Hechtman, 2010; Murray-Close et al., 2010; Orobio de Castro el al., 2007) and the findings have been mixed. Brendgen et al. (2004) reported that positive bias predicted increased aggression but only for a highly aggressive group of children. Orobio de Castro et al. (2007) found that positive bias predicted increases in proactive (planned or instrumental) but not reactive (impulsive, dysregulated, and angry) aggression and only among peer-rejected children. The studies by Hoza et al. (2010) and Murray-Close et al. (2010) are unique in that they are based on data from the Multimodal Treatment Study of Children with ADHD (MTA). Biased social self-perceptions of peer acceptance either did not predict increases in aggression (Hoza et al., 2010) or predicted aggression for only one of multiple time intervals (Murray-Close et al., 2010), thus offering weak support for bias as a predictor of increased aggression over time. Notably, none of the aforementioned studies examined the prospective relationship between

positive bias and relational aggression. Concurrent analyses have found evidence for perceptual bias being positively associated with greater relational aggression (David & Kistner, 2000; McQuade et al., 2014; Sandstrom & Herlan, 2007), adding some empirical support for further study of this relationship. Thus, in general, the literature is limited by a lack of longitudinal studies testing prospective associations between bias and different subtypes of aggression. Longitudinal studies that test whether overly positive views of peer acceptance predict increases in overt aggression, relational aggression, or both, would help clarify the nature of these relations.

It is also important to evaluate whether the link between bias and aggression applies to the general population of children or is limited to a subgroup of children with peer relationship problems. According to the threatened egotism hypothesis, it is the discrepancy between one's perceived competence and feedback received from others that triggers aggression; this association is expected regardless of their level of actual competence. Specifically, Baumeister and colleagues (1996) note that "people who believe themselves to be among the top 10% on any dimension may be insulted and threatened whenever anyone asserts that they are in the 80th, 50th, or 25th percentile" (p. 8). However, according to the "disputed overestimation" hypothesis, positive bias leads to aggression when children receive feedback that is actually negative, not merely more negative than their self-perceptions (Orobio de Castro et al., 2007). In line with their theorizing, these authors expect that associations between overestimation and aggressive behavior are specific to children with peer relationship problems because these children are more likely than others to receive negative social feedback. Although peer rejection status (i.e., whether or not they are rejected by peers) serves only as a proxy for receiving negative peer feedback, it is commonly used in studies that test the disputed overestimation hypothesis. Findings from several studies offer support for disputed overestimation in that positive perceptual bias predicted aggression in rejected but not nonrejected groups of children (e.g., Diamantopoulou et al., 2008; Orobio de Castro et al., 2007; White & Kistner, 2011). However, the results reported by a recent study suggest that disputed overestimation may apply to overt but not relational aggression. In the only study that has tested whether peer status moderates the association between positive bias and relational aggression, McQuade et al. (2014) found that while peer status moderated the associations between bias and both forms of aggression, for relational aggression it was very highly preferred, rather than very low-preferred (or rejected), girls that had higher rates of relational aggression when they had positively biased self-perceptions. Given that this was the first study to test the moderating effect of peer status on the link between bias and relational aggression, it is important to replicate these findings.

Another way to enhance our understanding of the prospective associations between bias and different forms of aggressive conduct is to examine whether these relationships hold when controlling for other variables that are associated with perceptual bias or aggression, such as gender, race/ethnicity, and peer rejection status. For example, boys are more likely than girls to have positively biased self-perceptions (e.g., Cole et al., 1999; McGrath & Repetti, 2002) and exhibit more aggressive behavior (e.g., Cohen et al., 1993; Crick & Grotpeter, 1995; Maccoby, 1998; Olweus, 1994; Paquette & Underwood, 1999; Thomaes, Bushman, Stegge, & Olthof, 2008). It is thus important that studies examining associations between bias and aggression include gender as a control variable in prediction models. Similarly, because past

research has found significant differences across racial and ethnic groups with African American children showing more aggressive behavior and positive bias than Caucasian children (e.g., Coie, Dodge, & Coppotelli, 1982; Dunkel, Kistner, & David-Ferdon, 2010; Kistner, Metzler, Gatlin, & Risi, 1993; Farrington, Loeber, Stouthamer-Loeber, Kammen, & Schmidt, 1996; Weigel, 1985; Zakriski & Coie, 1996), it is important to statistically control for race/ethnicity. Peer rejection is another variable that is related to positively biased self-perceptions and aggression (e.g., Bierman, Smoot, & Aumiller, 1993; Cassidy & Asher, 1992; Coie, Lochman, & Hyman, 1992; Crick & Ladd, 1990; Dodge et al., 2003; Ladd & Troop-Gordon, 2003; Parker & Asher, 1987). As such, peer rejection should be controlled for in studies assessing predictive links between bias and aggression.

Additionally, to draw conclusions about unique associations of bias with overt and relational aggression, prospective links between bias and each type of aggression were examined while controlling for the alternate type of aggression. This is important for drawing accurate conclusions about the role bias may play in the development of these two types of aggression. That is, bias might be causally linked to one type of aggression but not the other, but because of the moderate to strong correlations between overt and relational aggression, one might find that bias predicts both types of aggression when examined in separate prediction models. By controlling for the alternate type of aggression and thereby testing for unique associations, the risk of reporting misleading findings is reduced.

Present Study

In summary, a growing body of evidence suggests that positively biased self-perceptions contribute to children's aggression, but a number of questions regarding bias as a risk factor for aggression remain. The present study attempted to advance our understanding of the role that biased social self-perceptions may play in children's aggression by examining prospective associations with both overt and relational aggression. Specifically, this study tests whether bias predicts increases in overt and relational aggression over a 6-month interval.

The current study addresses three primary goals and hypotheses. The first main goal of the study was to examine the prospective associations between positively biased self-perceptions and two forms of aggression (overt and relational), while attempting to rule out confounding variables that might account for these relationships. In general, previous work shows support for concurrent associations between positive bias and both forms of aggression (e.g., David & Kistner, 2000; Diamantopoulou et al., 2008; Hughes et al., 1997; McQuade et al., 2014; Sandstrom & Herlan, 2007). Though the prospective links between positive bias and overt and relational aggression have not yet been examined in the same study (or not at all, in the case of relational aggression), there is some research to suggest that positive bias and aggression are linked longitudinally (Brendgen et al., 2004; Hoza et al., 2010; Murray-Close et al., 2010; Orobio de Castro el al., 2007). This might suggest that the processes are the same for both types of aggression – overly inflated self-views, in the context of discrepant social feedback, elicit aggressive behavior – and the aggressive response could be either overt or relational in nature. Thus, it was predicted that positively biased perceptions of peer acceptance would predict increases in both overt and relational aggression over a 6-month

interval, controlling for children's demographic characteristics (i.e., gender and race/ethnicity) and peer relationship indicators (i.e., peer rejection status). However, because the negative social feedback received by children with positively biased self-perceptions is likely to be perceived as relational aggression and a focus on relational stressors has been shown to be associated with increased in relational aggression (Crick et al., 2002; Yeung & Leadbeater, 2007), it was expected that relational aggression might be especially typical for children with positively biased self-perceptions.

The second main goal of the study was to investigate whether positive bias *uniquely* predicts both overt and relational forms of aggression over time. Thus, we were interested in testing whether positive bias predicts increases in overt and relational aggression when controlling for the alternate form of aggression. Preliminary research suggests that positive bias is concurrently associated with both forms of aggression, above and beyond the alternate form of aggression (McQuade et al., 2014). Given these findings, it was predicted that positive bias would uniquely predict increases in overt aggression, controlling for relational aggression, and that positive bias would uniquely predict increased relational aggression over time, controlling for overt aggression.

The final goal of the study was to test whether peer rejection moderates prospective associations between positive bias and both forms of aggression such that these associations are significant only for peer-rejected children. Based on past studies and in keeping with the disputed overestimation hypothesis, it was predicted that positive bias would predict increases in overt aggression among peer-rejected children. However, research on relational aggression is less clear, with only one study testing whether disputed overestimation applies to aggressive behavior that is relational in nature, and the findings conflict with those from studies examining overt aggression. Specifically, McQuade et al. (2014) found that positive bias was associated with higher levels of relational aggression for highly accepted, rather than rejected, children. Thus, it is possible that peer rejection does not moderate the association between positive bias and relational aggression, or, if it does, it may not be in the expected direction.

Method

Participants

Participants in the present study were part of a larger research project investigating the impact of aggression on social development, emotional adjustment, and academic achievement. The current study focused on data collected from 712 children in grades 3 through 5 from eight public elementary schools in a small metropolitan community in the southeast. Of the participants, 326 (45.8%) were male and 386 (54.2%) were female. The average age of participants at Time 1 was 9.4 years ($SD = .99$). The distribution of race and ethnicity of the sample was: 495 (69.5%) Caucasian, 191 (26.8%) African American, and 26 (3.7%) represented other ethnic/racial groups (i.e., Asian, Hispanic, Indian). The percentage of the students at each school who qualified for free or reduced price lunches served as an indicator of each school's SES level. Schools that were below the district median (i.e., had a low percentage of the student body participating in the free or reduced-price lunch program) were identified as middle SES schools and schools above the district median (i.e., had a high

percentage of the student body participating in the free or reduced-price lunch program) were identified as low SES. Based on this criterion, 611 (85.8%) of the sample attended schools that were middle SES, and 101 (14.2%) attended schools that were low SES.

Measures

Actual Acceptance (AA)—Children's actual peer acceptance was assessed using sociometric ratings (see Asher & Dodge, 1986; Singleton & Asher, 1977). Specifically, children were presented with a roster list containing the names of all students in each classroom and asked to rate the extent to which they like each classmate using a 5-point Likert rating scale (ranging from 1 = "do not like at all" to 5 = "like very much"). These ratings were summed, averaged, and standardized within each classroom to create a continuous peer acceptance score (AA). Among children, peer ratings have been shown to be reliable and valid indices of peer acceptance (e.g., Hymel, Vaillancourt, McDougall, & Renshaw, 2002; Jiang & Cillessen, 2005; Maassen, van Boxtel, & Goossens, 2005).

Perceived Acceptance (PA)—To assess children's perceived peer acceptance, children were provided the same roster of their classmates' names and asked to predict the ratings they thought they would receive from each classmate using the same 5-point Likert rating scale. The predicted ratings were summed, averaged, and standardized within-class to yield a continuous perceived peer acceptance score (PA). Peer ratings have been found to be reliable and valid measures of children's perceived peer acceptance (e.g., Bagwell, Molina, Pelham, & Hoza, 2001; Harter, 1985; Harter & Pike, 1984).

Perceptual Bias—Bias is conceptualized as the variance in children's perceived acceptance that is not accounted for by their actual acceptance. Perceptual bias scores were created by regressing participants' PA ratings onto their AA ratings and saving the remaining variances as residual scores. These residual scores were standardized within the sample by dividing them by the standard deviation of the unstandardized residual scores. The remaining residual difference bias scores were used as an index of children's social perceptual bias where positive values reflect a child's tendency to overestimate their peer acceptance and negative values represent an underestimation of peer acceptance. Residual bias scores have been used as an index of perceptual bias in numerous studies (e.g., Brendgen et al., 2004; David & Kistner, 2000; Orobio de Castro et al., 2007; White & Kistner, 2011). Residual scores were chosen over alternative methods to assess bias because residual score partials out the variance in PA that is accounted for by AA (Stephens, Kistner, & Lynch, 2014). Previous studies that used residual bias scores have reported moderate stability across a three-year period (e.g., McGrath & Repetti, 2002). Also, residual scores have been documented to significantly correlate with outcome measures (e.g., depression and aggression: Cole, Martin, Peeke, Seroczynski, & Hoffman, 1998; White & Kistner, 2011).

Peer Rejection Status (PRS)—Sociometric nominations were used to classify children as peer-rejected. Children were presented with class rosters that included all students in each classroom and asked to circle the names of three classmates they most liked to play with (Like Most nominations: LM) and three classmates they least liked to play with (Like Least

nominations: LL). The number of nominations each child received from classmates was tallied and then standardized number within classroom, yielding a standardized LM and LL score. A social preference score was created by subtracting the standardized LL scores from the standardized LM scores. A dichotomous peer rejection status variable (PRS) was created using the social preference score. Children with social preference scores more than one standard deviation below the mean of the sample were classified as rejected ($n = 134$ or 18.8%). All other children were classified as non-rejected. This method of assessing how well liked or disliked children are by their peers has been widely used in studies of children's peer relationships and there is substantial support for the reliability and validity of this measure (Coie et al., 1982; Terry & Coie, 1991).

Aggressive Behavior—Overt and relational forms of aggression were assessed with the Children's—Social Behavior Scale Peer Report (CSBS-P)—a peer nomination measure that was developed by Crick (1997). The CSBS-P is a widely used measure consisting of three scales: (1) a 5-item overt aggression scale that describes verbal (e.g., "calls others mean names") and physical (e.g., "hit, kick, or punch other kids") acts of aggression; (2) a 5-item relational scale that describes behavior aimed at damaging another peer's reputation or relationships (e.g., "when they are mad at a person, they get even by keeping the person from being in their group of friends"); and (3) a 4-item scale that measures prosocial behavior (e.g., "I help others": Crick et al., 1996; Crick & Grotpeter, 1995). For the purposes of this study, only the overt and relational aggression scales were considered. Participants were provided with a roster list that included the names of all of their classmates and were asked to nominate up to three classmates for each of the items on the peer nomination instrument. For each item, the number of peer nominations that each child received was summed and divided by the number of possible nominators. Next, nominations across items on each subscale were summed, averaged, and standardized within class to form peer measures of overt and relational aggression. Test-retest reliabilities in the current sample were $r = .88$ for overt aggression and $r = .74$ for relational aggression.

Procedure

The procedures for this study were approved by the Institutional Review Board at Florida State University. Data for this study were collected at two different time points within the same school year. Written parental consent and child assent were obtained for all participants prior to the start of the study. Child assent was obtained again prior to the start of Time 2 data collection. All children in the participating classrooms were listed on the class rosters (see Measures) that were handed out to the participants. Nominations of classmates who were not participants in this study were not included in the data analyses. To allow students time to acclimate to school and their peers, Time 1 data were collected approximately three months after the start of the school year and Time 2 data collection sessions occurred approximately six months later. For both Time 1 and Time 2, all measures were completed within two 60-minute data collection sessions that were approximately one week apart.

Trained graduate and undergraduate research assistants administered measures to groups of participating children, providing assistance to children as needed. To ensure confidentiality

during the data collection sessions, children were placed into small groups (i.e., 6–8 students) that consisted of students from different classrooms and grades in order to minimize the possibility that they would compare or share answers. Moreover, participants were asked not to talk about their responses to the questionnaires during or after the assessment period. After the instructions were presented, children completed the measures at their own pace. Upon completion of the measures, research assistants reviewed each child's responses to ensure that all items were completed. In cases where an item(s) had been omitted, research assistants queried the children individually and encouraged them to provide a response. A distractor task (e.g., crossword puzzles and word-finds) was administered when participants completed the measures of the study in order to reduce the likelihood that the participants would discuss their responses to the measures when they returned to their classrooms.

Data analytic plan

In the *preliminary* analyses, participants' data were first screened for outliers, normality of distributions, and missing data prior to running the primary analyses. The Missing Value Analysis (MVA) in SPSS 20.0 revealed that 6.6% ($n = 47$) of cases had missing data. To estimate the pattern of missing values, Little's (1988) Missing Completely at Random (MCAR) test was conducted. Results showed a non-MCAR missing data pattern, χ^2 (19, 712) = 48.88, p < 0.001. Missing data were accounted for using multiple imputation (MI) in SPSS version 20.0. The method used for MI was fully conditional specification (FCS), which is an iterative Markov Chain Monte Carlo (MCMC) method that can be used for data that are considered to be missing at random and also in several cases of random missingness (Acock, 2005; Baraldi & Enders, 2010; Schafer & Graham, 2002). All variables to be included in the regression models were used as predictors in the imputation model, including an interaction term consisting of perceptual bias and PRS. Following recommendations by Graham, Olchowski, and Gilreath (2007), 20 datasets were generated. Data analysis was conducted on each imputed data set and the resulting parameter estimates and standard errors from each analysis were combined using Rubin's rules (Rubin, 1987). The final sample N was 712. With respect to tests of univariate normality, no significant violations for skewness and kurtosis were noted (see Tabachnick & Fidell, 2001). Similarly, tests for multivariate outliers via calculation of Mahalanobis distances revealed no significant outliers. For all analyses, all continuous variables were standardized. Given that other minorities (i.e., Asian, Hispanic, and Indian) had low representation in the sample, children's race was dichotomized as Caucasian or non-Caucasian (1 = Caucasian, 2 = non-Caucasian). Children's gender and peer rejection status were also coded dichotomously (1 = male, 2 = female; 1 = non-rejected, 2 = rejected peer status). Descriptive statistics and correlations for predictors and dependent measures were also calculated.

Tests of the study's main hypotheses involved two sets of analyses, each consisting of two hierarchical regression models. The first set of analyses was conducted to examine (a) whether children's overly positive perceptions of their peer acceptance would significantly predict increases in overt and relational aggression, and (if significant) (b) whether these predictive links would change after controlling the alternative form of aggression at T2. Two hierarchical regression analyses were conducted: one with T2 overt aggression as the

dependent variable and one with T2 relational aggression as the dependent variable. Predictors for both models were gender, race, and initial levels of aggression at T1 (overt aggression in the first model and relational aggression in the second model) in the first step, perceptual bias in the second step, and the alternative form of aggression at T2 (relational aggression in the first model and overt aggression in the second model) in the third step. This approach allowed for the examination of the predictive effect of children's perceptual bias of their peer acceptance on overt and relational aggression at T2 while controlling for the stability of aggression at T1 and the variance that may be accounted for by the alternative form of aggression at T2.

A second set of analyses were conducted to examine moderating effects of children's PRS. Similar to the first set of analyses, separate hierarchical multiple regressions were run for T2 overt and T2 relational aggression as the dependent variables. To test for moderating effects of PRS, perceptual bias and PRS were multiplied to obtain an interaction term. In both models, gender, race, initial levels of aggression at T1 (overt aggression in the first model and relational aggression in the second model), and peer rejection status were entered as predictors in the first step. Perceptual bias was entered in the second step, and the two-way interaction between perceptual bias and PRS was entered in the third step. Due to the high correlation between overt and relational aggression, multicollinearity statistics were examined for all regression models. Tolerance levels and variance inflation factors (VIF) were in acceptable ranges for all regression analyses. Further, z-standardizing the continuous variables decreased multicollinearity concerns (Holmbeck, 2002).

Results

Preliminary Analyses

The means and standard deviations for the primary study variables along with the correlations among these measures are presented in Table 1. Grade and SES were not significantly correlated with either form of aggression or perceptual bias, and were thus left out of the models. The demographic variables of gender and race were found to be associated with both T1 relational and overt aggression and were thus included as covariates in the main analyses. Consistent with prior research, boys were more overtly aggressive than girls at T1 and T2. Interestingly, boys were also perceived by classmates to be more relationally aggressive than girls, but only at T1. Boys were also more likely than girls to be classified as rejected. Non-Caucasian children were rated by classmates as less overtly and relationally aggressive than Caucasian children. In addition, positive bias was greater among non-Caucasian children than Caucasian children. Positive bias was associated with elevated overt and relational aggression at T1 and T2. In line with prior research, overt and relational aggression correlated at both time points (Cillessen & Mayeux, 2004; Crick & Grotpeter, 1995; Crick et al., 2007; Tomada & Schneider, 1997). Finally, overt and relational aggression were moderately to strongly stable over the 6-month prediction interval, which is consistent with results reported in prior longitudinal studies (e.g., Cillessen & Mayeux, 2004; Crick, 1996; Mayeux & Cillessen, 2008).

Do Positively Biased Perceptions Predict Increases in Overt and Relational Aggression?

To test the independent and unique predictive value of positive bias to change in aggression 6 months later, two separate hierarchical linear regression analyses were conducted to predict (a) overt aggression at T2, and (b) relational aggression at T2, respectively, as dependent variables. The respective values at T1 were included as control variables. The results for these analyses are provided in Table 2.

For overt aggression, initial level of overt aggression at T1 ($\beta = .86$, $p < .001$) significantly predicted overt aggression at T2, such that higher rates of overt aggression at Time 1 were associated with higher rates at T2. Race predicted changes in aggression over time ($\beta = .06$, $p = .003$); non-Caucasian children exhibited greater increases in overt aggression over the 6-month prediction interval than Caucasian children. Gender did not significantly predict T2 overt aggression ($\beta = -.01$, $p = .56$). The addition of perceptual bias at step 2 of the regression model indicated that bias was not significantly associated with T2 overt aggression ($\beta = -.01$, $p = .64$).

The analysis predicting relational aggression revealed that higher levels of T1 relational aggression predicted higher levels of T2 relational aggression ($\beta = .74$, $p < .001$). Gender significantly predicted changes in relational aggression over the 6-month prediction interval with girls exhibiting greater increases over time than boys ($\beta = .11$, $p < .001$). In addition, race predicted changes in relational aggression over time ($\beta = .06$, $p = .02$); non-Caucasian children exhibited greater increases in relational aggression from T1 to T2 than Caucasian children. The addition of perceptual bias on the second step of the regression model revealed that positive bias at T1 significantly predicted increased relational aggression at T2, above and beyond gender, race, and initial levels of relational aggression ($\beta = .05$, $p < .05$). To provide an even more stringent test of unique prospective associations between positive bias and increases in relational aggression, T2 overt aggression was added to the regression model in the following step ($\beta = .47$, $p < .001$) and bias remained a significant predictor of T2 relational aggression ($\beta = .05$, $p = .04$).

Does Peer Rejection Moderate Associations between Positive Bias and Aggression?

To test the disputed overestimation hypothesis, a second set of two hierarchical regression analyses were conducted. Similar to the first set of analyses, two separate hierarchical linear regression analyses were conducted to predict (a) overt aggression at T2, and (b) relational aggression at T2, respectively, as dependent variables. To determine whether the association between bias and aggression is characteristic of both rejected and non-rejected children, a multiplicative interaction term comprised of perceptual bias and PRS was included on the third step of both analyses.

The first model tested the prediction that the prospective association between perceptual bias and overt aggression would vary as a function of children's peer rejection status, even after controlling for demographic variables. After controlling for the effects of gender ($\beta = -.01$, $p = .55$), race ($\beta = .06$, $p = .002$), and initial levels of overt aggression ($\beta = .86$, $p < .001$), PRS was not significantly related to increases in overt aggression at T2 ($\beta = .04$, $p = .07$). In Step 2, no effect of bias on changes in overt aggression was found, $\beta = -.01$, $p = .64$. In

contrast to the disputed overestimation hypothesis, the interaction term entered on the third step showed that the linear effect of T1 perceptual bias on T2 overt aggression was not moderated by children's peer rejection status, $\beta = .01$, $p = .86$.

The second model was identical to the first except that relational aggression at T2 served as the dependent variable, and relational aggression at T1 was controlled for in Step 1. After controlling for the significant effects of gender ($\beta = .11$, $p < .001$), race ($\beta = .06$, $p = .02$), and relational aggression at T1 ($\beta = .74$, $p < .001$), PRS at T1 did not significantly contribute to the prediction of relational aggression at T2, ($\beta = .01$, $p = .83$). The addition of bias in Step 2 showed that after controlling for children's peer status, overestimation of peer acceptance at T1 continued to be a significant predictor of relational aggression at T2, $\beta = .05$, $p = .05$. Similar to the first analysis predicting overt aggression, the interaction of overestimation and PRS did not make any further contribution to the model, $\beta = .01$, $p = .67$.[1]

Discussion

Identifying the factors that contribute to aggression has the potential to advance etiological theories and enhance the effectiveness of treatment and preventive interventions. The present study investigated the role that positively biased social self-perceptions may play in the development of aggression. Specifically, this study expanded on prior research by examining prospective links between positive bias and aggression. Moreover, examining the impact of bias on relational aggression as well as the more typically studied overt aggression broadened the focus of prior work in this area. Three major findings emerged: 1) bias predicted increases in relational but not overt aggression; 2) the predictive link between bias and relational aggression remained significant when controlling for possible third variables as well as overt aggression; and 3) contrary to predictions of the disputed overestimation hypothesis, the links between bias and both forms of aggression was similar for rejected and non-rejected children.

This is the first study to our knowledge that examined the prospective link between bias and relational aggression in childhood. In fact, based on the literature reviewed in relation to biased self-perceptions and aggression, only three studies have reported on the concurrent association between bias and relational aggression (David & Kistner, 2000; McQuade et al., 2014; Sandstrom & Herlan, 2007). All three studies found at least some support for the hypothesis that children with positively biased self-perceptions were more likely to exhibit relational aggression. The present study extended this line of research by examining the prospective links between bias and relational aggression. Bias predicted increases in relational aggression over a 6-month interval, even when the effects of gender, race, and peer rejection on aggression were controlled. Importantly, this prospective link also remained significant after controlling for overt aggression, suggesting that positively biased self-

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[1]To determine whether dichotomizing the continuous social preference variable to create the dichotomous peer rejection variable influenced the results, hierarchical regression analyses were re-run using a continuous measure of peer rejection. Results of these analyses (available from the first author upon request) were largely consistent with those reported in the paper in that social preference did not moderate associations between positively biased self-perceptions and overt or relational aggression. There was a significant main effect of social preference on overt but not relational aggression.

perceptions uniquely predict relational aggression. This finding offers support for the hypothesis that children who hold positively biased perceptions of their peer acceptance are at increased risk for relational aggression although the strength of this predictive link was modest (i.e., bias predicted 5% of the variance in relational aggression at Time 2). No doubt the magnitude of the predictive link was constrained by the high stability of relational aggression over the 6-month prediction interval (i.e., initial levels of relational aggression accounted for 56% of the variance of Time 2 relational aggression leaving relatively little variance to be predicted by bias). Thus, the present study provided a stringent test of the hypothesis that bias predicts increases in relational aggression. The finding that bias predicted Time 2 relational aggression over the variance accounted for by initial levels of relational aggression, gender, race, and peer rejection is noteworthy and suggests that further study of the role that positively biased perceptions may play in the development of this type of aggression is warranted.

Although the processes by which positively biased perceptions of peer acceptance contribute to acts of relational aggression were not directly assessed in this study, our results suggest that children who hold positively biased perceptions of their peer acceptance may be especially likely to react to feedback that challenges their overly positive self-view with efforts to damage the peer relationships of their peers (i.e., relational aggression). An important direction of future research is to identify the processes by which positively biased social self-perceptions lead to increases in relational aggression. It may be that children who receive negative feedback from peers (or feedback that is at odds with their self-views) interpret this feedback to be an act of relational aggression and respond in kind. That is, when children with overly positive perceptions of their peer acceptance find that they are excluded from some peer group activities, they may interpret this information as intentional efforts to harm their social relationships with peers and respond with similar behavior toward those they perceive as the "aggressors." In essence, because they perceive themselves to be very well liked by peers they do not attribute it to possible problematic behavior on their part but instead attribute it to peers' efforts to harm their social relationships (i.e., relational aggression). This then elicits similar behavior in retaliation or relational aggression. It will be important to test this explanation as well as other possible causal mechanisms in future research.

Contrary to our hypothesis, positive bias did not predict increases in overt aggression. This finding was surprising given the many studies that report significant concurrent associations between bias and this form of aggression. Interpreting null findings is always a challenge. While the lack of a significant link between bias and increases in overt aggression calls into question whether bias is a causal risk factor for this form of aggression, other explanations for the lack of a significant predictive link must be considered. The explanation that seems most compelling is the high stability of overt aggression across the 6-month prediction interval. As discussed in regard to the findings for relational aggression, controlling for initial levels of aggression leaves little variance for the measure of biased perceptions of peer acceptance to predict. This is especially true for overt aggression with a stability coefficient of .88 over the 6-month prediction interval. It is possible that the negative consequences of positive bias for overt aggression may only become apparent over longer periods of time (Robin & Beer, 2001).

The disputed overestimation hypothesis suggests that the association between positively biased self-perceptions and aggression is specifically relevant to peer-rejected children because they are more likely to receive feedback that is contradictory to their self-appraisals (Orobio de Castro et al., 2007). Contrary to the findings of recent studies in which the link between bias and aggression was significantly moderated by peer rejection status (Orobio de Castro et al., 2007; McQuade et al., 2014; White & Kistner, 2011), the prospective associations between positive bias and both forms of aggression were not found to vary as a function of peer rejection in the current study. Importantly, positive bias predicted increased relational aggression for children who were and were not peer-rejected. In line with the threatened egotism hypothesis, these findings suggest that children with positively biased self-perceptions are vulnerable to ego threats in the form of any feedback that is discrepant with their self-view and is relatively negative. That is, the feedback does not necessarily need to be qualitatively negative (and rejecting) for these children to perceive themselves as receiving a threat to their positive self-view, and consequently responding aggressively. There are a number of methodological differences across studies that may contribute to these incongruent findings. For example, use of peer- versus teacher- rated measures of aggression could contribute to discrepant findings because children in the late elementary school years are more likely to exhibit aggression when adults are not present (e.g., Coie, Dodge, & Kupersmidt, 1990; Crick, 1996; Ledingham & Younger, 1985). Thus, peers may be more likely than teachers to witness aggressive acts of rejected as well as non-rejected peers which could, in turn, impact the findings regarding the moderating effect of peer rejection on associations between bias and aggression. Differences in the types of aggression studied could also account for the discrepant findings across studies. The current investigation examined overt and relational aggression, whereas both White and Kistner (2011) and Orobio de Castro et al. (2007) examined reactive and proactive functions of aggression. It is possible that the moderating effect of social status that was found in both of those studies is a result of their use of measures assessing functional subtypes of aggression. Interestingly, their specific findings were not in agreement. While both studies found that the bias-aggression links were limited to a peer-rejected subgroup of their sample, White and Kistner (2011) observed a unique association between biased self-perceptions and reactive aggression whereas Orobio de Castro et al. (2007) found that perceptual bias was uniquely associated with proactive, but not reactive, aggression.

Strengths, limitations, and future directions

The present study had a number of strengths (e.g., expanding research on bias to include relational aggression; longitudinal design; inclusion of control variables) but as with any study, there were also some limitations that merit discussion. First, measures of overt and relational aggression, actual peer acceptance, and peer rejection were all derived from peer informants. There is a great deal of evidence in support of the reliability and validity of peer ratings/nominations to measure children's peer relationships and aggression (e.g., Crick, 1996; Crick & Grotpeter, 1995; Grotpeter & Crick, 1996; Rys & Bear, 1997; Tomada & Schneider, 1997), but reliance on peer informants for multiple measures does raise concerns about intra-rater bias. One concern is that children may have given negative ratings/ nominations on all measures to peers they dislike and that this accounts for the finding that positive bias predicts increases in relational aggression. This seems unlikely for several

reasons. First, while peer ratings of acceptance did contribute to the creation of bias scores, our measure of bias is a residual score reflecting the variance in perceived peer acceptance not accounted for by peer-rated "actual" acceptance, so that the bias measure does not correlate with peer-rated acceptance. Second, the second set of predictive models included peer rejection. If the association between bias and relational aggression merely reflects children giving negative ratings on all measures to the peers they dislike, inclusion of peer rejection would have eliminated the link between bias and aggression. Although we do not think our finding of bias predicting relational aggression can be explained by intra-rater bias, future research should attempt to replicate our findings using measures based on multiple informants.

Second, although the present study was longitudinal in nature, data collection was limited to two time points. This limits the conclusions that can be drawn regarding the causal relations between overestimations of peer acceptance and children's aggressive behavior. Nonetheless, given the lack of research on associations between positively biased self-perceptions and relational aggression in particular, this study provides an important step towards increasing our theoretical understanding of the role that perceptual bias may play in the development and maintenance of children's relationally aggressive behavior. Future longitudinal studies would benefit from replicating the results of the present study using additional time points.

The scope of this study was limited to testing whether bias predicted increases in aggression; it did not directly assess the mechanisms that might underlie these predictive links. No attempt was made to directly assess or manipulate social feedback in order to test the threatened egotism and disputed overestimation hypotheses. Although one experimental manipulation of negative peer feedback has found that positive bias increased negative emotional reactions (e.g., feeling angry, ashamed, irritated) following negative peer feedback (Thomaes et al., 2009), how similar manipulations of feedback may be related specifically to aggressive behavior, rather than negative mood, have not yet been explored. Furthermore, that study included only feedback that was either absolutely negative or neutral. As noted previously, it might not be the case that only qualitatively negative feedback triggers aggressive behavior in children who hold positively biased self-perceptions; rather, aggressive responses may be elicited by feedback that is discrepant and relatively negative. Thus, in order to better understand specifically how positive bias, ego threats, and aggression are linked, future experimental paradigms should consider including feedback that is discrepant and relatively negative (but non-rejecting) in addition to other forms of feedback (e.g., discrepant and absolutely negative, and neutral). In addition to continuing work that directly assesses ego threats through manipulating the social appraisals that children receive, future studies should consider including a measure to determine whether children perceive themselves as receiving ego threats (in the form of relatively negative feedback) as well as one to assess whether they actually do receive ego threats. Behavioral observations of children's social interactions to identify the specific triggers for aggression among children with overly positive self-perceptions would also provide valuable information.

Conclusion

This study is one of the first to examine longitudinal associations between positive bias and both overt and relational aggression. A novel contribution of this study is that positive bias led to increases in relational, but not overt, aggression. Thus, biased self-perceptions seem to be a practical target for intervention efforts aimed at childhood aggression. However, interventions that are aimed at increasing children's self-esteem or self-evaluations should use caution in promoting overly positive self-evaluations, as the findings from this study would suggest that positively biased self-views promote further aggression. Rather, interventions that focus on increasing children's actual social competence as a way to improve their peer acceptance may be more successful at reducing aggressive behavior. Approaches that may be particularly useful in this respect are social skills training and problem solving skills training, which have the potential to improve children's ability to read and respond to social cues (e.g., Bierman, 2004). Given support for the threatened egotism hypothesis, one specific target that problem solving training might benefit from is teaching children how to cope with feedback that is less favorable than their own self-view. Further, a comprehensive intervention program that intervenes at multiple levels and areas of functioning (e.g., development of accurate self-perceptions, decreasing aggressive behavior, and improving social interaction skills) may help to prevent accumulating difficulties. Ideally, the implementation of such programs would occur before children start to display above average rates of aggressive behavior. The finding that both overt and relational aggression were highly stable over time reinforces the importance of implementing prevention and intervention programs early on. It will be important for future research to continue studying the specific relations of positively biased self-perceptions and overt and relational aggression, as this information may be useful for developing targeted interventions.

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TABLE 1

Means, Standard Deviations, and Correlations Between Study Variables for Full Sample

	Mean	SD	1	2	3	4	5	6	7	8
1. Gender	—	—	—							
2. Race	—	—	-02	—						
3. T1 Overt aggression	.12	.17	-.38**	.19**	—					
4. T2 Overt aggression	.12	.18	-.34**	.23**	.88**	—				
5. T1 Relational aggression	.12	.11	-.15**	.15**	.81**	.75**	—			
6. T2 Relational aggression	.13	.12	-.01	.18**	.60**	.72**	.74**	—		
7. Perceptual bias	.00	1.00	.03	.28**	.17**	.16**	.18**	.21**	—	
8. Peer rejection status	—	—	-.11**	.03	.28**	.28**	.26**	.19**	.04	—

Note. Aggression raw score means and standard deviations and aggression *z*-score correlations are presented. Means, standard deviations, and correlations for perceptual bias represent standardized residual scores. Coding for Gender was 1 (male) and 2 (female). Coding for Race was 1 (Caucasian) and 2 (non-Caucasian). Peer rejection status = Peer rejection group (1 = non-rejected, 2 = rejected).

*
P<.05.

**
P<.01.

TABLE II

Hierarchical Regression Analyses of Perceptual Bias Predicting to Overt Aggression and Relational Aggression

Step no.	Predictors	B	SE B	b	t	R^2 Change	F Change
Set A: DV = T2 Overt aggression							
Step 1						.78	816.64 ***
	Gender	−.02	.04	−.01	−.58		
	Race	.12	.04	.06	2.99 **		
	T1 Overt aggression	.86	.02	.86	43.24 ***		
Step 2						.00	.28
	Perceptual bias	−.01	.02	−.01	−.47		
Step 3						.06	247.68 ***
	T2 Relational aggression	.32	.02	.32	15.03 ***		
Set B: DV = T2 Relational aggression						.56	299.22 ***
	Gender	.21	.05	.11	4.13 ***		
	Race	.13	.06	.06	2.26 *		
	T1 Relational aggression	.75	.03	.75	28.32 ***		
Step 2						.01	4.20 *
	Perceptual bias	.05	.03	.05	2.0 *		
Step 3						.08	166.54 ***
	T2 Overt aggression	.47	.04	.47	12.44 ***		

Note. Coefficients and *t*-tests are reported at step in which variable was entered. Coding for Gender was 1 (male) and 2 (female). Coding for Race was 1 (Caucasian) and 2 (non-Caucasian).

*
$P < .05$.

**
P .01.

***
P .001.

TABLE III

Hierarchical Regression Analyses of Perceptual Bias, Rejected Social Status, and Their Interaction Predicting to Aggression

Step no.	Predictors	B	SE B	b	t	R^2 Change	F Change
Set A: DV = T2 Overt aggression							
Step 1						.78	615.93***
	Gender	−.02	.04	−.01	−.60		
	Race	.12	.04	.06	3.03**		
	T1 Overt aggression	.85	.02	.86	41.41***		
	Peer rejection status	.09	.05	.04	1.83		
Step 2						.00	.27
	Perceptual bias	−.01	.02	−.01	−.47		
Step 3						.00	.16
	Bias x rejection	.01	.04	.01	.18		
Set B: DV = T2 Relational Aggression							
Step 1						.56	224.22***
	Gender	.21	.05	.11	4.14***		
	Race	.13	.06	.06	2.26*		
	T1 Relational aggression	.74	.03	.74	27.57***		
	Peer rejection status	.02	.07	.01	.22		
Step 2						.01	4.20*
	Perceptual bias	.05	.03	.05	1.97*		
Step 3						.00	.36
	Bias x rejection	.03	.06	.01	.42		

Note. Coefficients and *t*-tests are reported at step in which variable was entered. Coding for Gender was 1 (male) and 2 (female). Coding for Race was 1 (Caucasian) and 2 (non-Caucasian). Peer rejection status = Peer rejection group (1 = non-rejected, 2 = rejected).

*
P .05.

**
P .01.

***
P .001.