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ORIGINAL ARTICLE

Positively Biased Self-Perceptions: Who Has Them and What are Their Effects?

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Abstract This study examined demographic and social competency characteristics of children who hold overly-positive self-perceptions of their social acceptance (positive bias). The effects of holding positive bias on aggressive and depressive symptoms were examined in a sample that excluded children on the extreme negative end of the bias continuum. Measures of peer-rated and self-perceived acceptance were obtained for 366 children in the 3rd through 5th grades. Peer-rated aggressive behavior and self-reported depressive symptoms were also collected. Results demonstrated sex, ethnicity, and social preference were uniquely associated with positive bias. Positive bias was related to aggression beyond the effects of social preference. Positive bias was not related to depressive symptoms. This study clarified who is likely to hold positive bias and replicated findings that suggest positive bias is a risk factor for aggressive outcomes. The idea that positive bias is neither a risk nor protective factor for depressive symptoms is discussed.

Keywords Positive illusory bias · Self-perceptions · Aggression · Depression · Peer acceptance

Introduction

Overly positive self-perceptions of social acceptance (positive bias) are a developmentally typical phenomenon in early childhood [1]. But, as children mature into middle childhood they are better equipped to assimilate information received from their social environments into their self-perceived social competence [2]. As such, self-perceptions of social acceptance should become more realistic during the later elementary school years. Yet, a subset of children in this age range maintains their positive bias. There is substantial evidence to suggest that holding positive bias past an age when it would be considered developmentally appropriate puts children at risk for poor socio-emotional functioning with respect to aggression [3, 4]. Conversely, there is evidence to suggest that holding positive bias may, in fact, be a protective factor against the internalizing symptoms of depression [5–7]. The present study aims to clarify the extent to which positive bias is related to aggressive and depressive outcomes. In order to aid prevention and intervention efforts, this study also seeks to identify characteristics that may put children at risk for holding positive bias.

Biased self-perceptions of social acceptance are self-evaluations that systematically differ from one or more measures of social acceptance. A bias score, herein referred to as "bias," is typically calculated by comparing a child's self-perception of his or her own social acceptance with other informants' (e.g., peers, teachers, parents) reports of the child's social acceptance. Bias is most often used as a continuous variable that ranges from extremely negatively biased (i.e., children who perceive themselves as less well-liked than others report) to extremely positively biased (i.e., children who perceive themselves as more well-liked than others report). A large body of research on the psychosocial difficulties related to positive bias exists for children with ADHD [8], as overly positive self-perceptions are common in this clinical population. Although it is not as prevalent [9], bias does exist in non-clinical child populations [3] and has been shown to be related to

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psychosocial difficulties with respect to the enactment of aggression [10–12] and depressive symptoms [13–15].

Positive Bias and Aggression

Baumeister et al. [16] have argued that unrealistically high self-perceptions predict aggression according to the *threatened egotism hypothesis.* This theory asserts that when individuals with positive bias encounter social feedback that is not in line with their perceptions, feelings of anger or resentment are elicited and then directed towards the source of this negative feedback. When children react in an aggressive manner, the accuracy of this negative social feedback is negated, this in turn puts an end to receiving negatively valenced information from that source. Although acting aggressively may preserve positive bias, it may also serve to increase the enactment of aggression in the future, thereby inhibiting more adaptive methods of responding.

A multitude of studies have found support for the threatened egotism hypothesis while using a continuous measure of bias. Some studies have found support for the idea that over-estimation of social acceptance, in general, is enough to lead to aggressive behavior [3, 10–12] while other studies suggest aggression is most common among children who over-estimate their social acceptance *and* experience social rejection (i.e., disputed overestimation) [4, 17, 18]. Only a few studies have examined the relationship between bias and aggression using a method other than a continuous measure of bias but those studies did not directly test the relationship between bias and aggression. For example, one study created groups among children characterized as "unpopular" based on child social characteristics (i.e., social withdrawal and aggression) and then examined group differences in bias [19]. But, because the groupings confounded popularity with aggression, the strength of the relationship between bias and aggression in that study remained unclear.

Positive Bias and Depressive Symptoms

The *depressive realism* literature suggests that people who are prone to depressive symptoms are generally more accurate with respect to their self-perceptions than comparison groups [20]. In a study that supported the idea of depressive realism, clinically depressed adults tended to rate themselves as less socially competent than nondepressed participants. When compared to observer ratings of participants' actual social competencies, it was clear that nondepressed participants perceived themselves more positively than others saw them whereas the depressed participants perceived themselves as they were actually seen by observers [21]. Based on the primarily adult-focused depressive realism literature, some researchers propose that positively biased self-perceptions are actually protective against depressive symptoms [5, 22].

Studies that examined links between biased self-perceptions and depressive symptoms offer mixed support for the self-protective role of positive bias. In the adult literature, Whitton et al. [6] found that more negative bias was associated with elevated depressive symptoms while more positive bias was associated with lower depressive symptoms. With respect to children, one study found evidence of a bi-directional relationship between bias and depressive symptoms such that a decrease in positive bias predicted an increase in depressive symptoms and vice versa [23]. Other studies found that depressive symptoms predicted a decrease in positive bias but an increase in positive bias did not predict a decrease in depressive symptoms [13–15, 24, 25]. All of these studies used continuous measures of bias to make their conclusions about the potential protective function of holding positive bias.

Problematic Interpretations of Findings

As reviewed above, the extant research on positive bias uses a continuum of bias to examine risk- and protective factors associated with positive bias. If a positive relationship was found between bias and aggression, researchers interpreted this result as support for the idea that children with positive bias are at risk for aggression. Likewise, if a negative relationship was found between bias and depressive symptoms, researchers interpreted this result as support for the idea that positive bias may be protective against depressive symptoms. There are a number of benefits to keeping bias as a continuous variable. Most notably, statistical power is maximized and the risk of type II error is minimized. Also, the dilemma of selecting an appropriate and informative cut-score along this continuum for the purpose of forming distinct groups is circumvented. However, using the full continuum of bias to examine characteristics that might lead some children to maintain positively biased self-perceptions or to examine the risk for negative developmental outcomes (e.g., aggression; depression) presents problems of interpretation of findings. Specifically, is it truly *positive* bias that is related to these outcomes or are these relationships artificially produced due to the inclusion of negatively biased children in the analyses? For example, it is possible that the positive relationship between bias and aggression [3] is driven by the fact that children who hold particularly negative self-perceptions are quite *unlikely* to act aggressively [26] rather than the typical interpretation of this result: that children who hold positive bias are more likely to act aggressively than their less biased peers.

Similarly, the negative relationship between bias and depressive symptoms [6] may be artificially created due to the fact that children who have overly negative self-perceptions tend to have high levels of depressive symptoms [26] rather than overly positive self-perceptions serving as a protective factor. If positive bias confers some protection to depression, then one would expect children who hold positive bias would report fewer depressive symptoms relative to children with realistic (i.e., unbiased) self-perceptions. Currently, the extant literature on the associations between bias and aggression and depressive symptoms has almost exclusively used the full continuum of bias approach. An investigation that excludes children who hold negatively biased self-perceptions of their social acceptance is necessary in order to corroborate or refute the interpretations of results from studies that use the full continuum of bias to examine its correlates.

Characteristics of Positively Biased Children

Given the socio-emotional difficulties associated with the inability to accurately assess one's social acceptance, it is important to identify the characteristics of children who are likely to hold positive bias. Despite popular perceptions of boys being more prone to positive bias than girls, studies that assessed sex differences in biased self-perceptions (i.e., the degree to which children systematically overestimated or underestimated their acceptance) have yielded mixed findings. One study found that girls were *not* more biased than boys but that they did tend to predict and receive more positive ratings than boys when rating specific peers [27]. In contrast, another study found that boys tended to overestimate and girls were inclined to underestimate acceptance when evaluating their general social standing [14]. Finally, Cole et al. [24] did not find any sex differences with respect to bias. Taken together, the extant research suggests limited sex differences in the extent to which children are likely to hold positive bias. But if a sex effect is found, it seems likely that boys would be more inclined to overestimate their social acceptance than girls. Importantly, all studies that have examined positive bias in a typically developing sample have used the entire spectrum of bias as a continuous measure (i.e., from extremely negatively biased to extremely positively biased). An examination of sex differences in a sample that is restricted to those children whose perceived acceptance ranges from accurate to positively biased would help clarify whether boys are, indeed, more likely to overestimate their social acceptance than girls.

Positive bias has also been linked with children's ethnicity [3, 27] with African American children more likely to have overly positive perceptions of their social acceptance relative to Caucasian children. Although the cause(s) of greater bias among African American children is not yet known, parental socialization is thought to play a role. In order to prepare their children for encountering racial prejudice, studies have shown that African American parents are more likely to educate their children about discrimination and how to cope with such experiences than are Caucasian parents [28–30]. This family practice has been associated with higher peer self-esteem for African American children than Caucasian children [31, 32] and could possibly explain positively biased perceptions of social acceptance.

Children's social preference (i.e., the extent to which children are liked vs. disliked by their peers) is another clear candidate for a factor that may influence the likelihood of holding positive bias. Findings from a number of studies suggest that children with lower social preference may be more inclined to overestimate their social acceptance [19, 33]. The association between social preference and bias may simply reflect a methodological link (i.e., children who are not liked by their peers have a naturally higher ceiling when it comes time for them to predict how well-liked they are by their classmates and thus have more room to overestimate their social acceptance than their well-liked peers) but other factors, such as the experiences of children with low peer acceptance, may contribute. For example, children who are not well-liked by their peers will have fewer opportunities to socialize and therefore, receive less social feedback from their environment about their social acceptance. With little social information on which to base their self-evaluations, these disliked children may be at greater risk of inaccuracy when determining the extent to which they are accepted by their peers. Regardless of the mechanism by which social preference is associated with bias, it is critical to control for it when examining associations between bias and measures of aggression and depression. Social preference has clearly been tied to bias [19], aggression [34, 35], and depressive symptoms [36, 37]. This leaves researchers to wonder whether it is bias that is related to aggression and depressive symptoms, or whether social preference is actually accounting for those relationships. As such, social preference should be controlled when examining the relationship between bias and these socio-emotional variables [38].

Finally, age is another candidate to consider. Overestimations of social acceptance are relatively normative in younger children (up to around age 8) because of the inability to distinguish between the desire to be competent and actual competence [2]. These overly-positive self-perceptions serve the function of encouraging young children to persist at activities that would otherwise seem beyond their capability (e.g., making friends in a new classroom). But as children move through middle childhood they gain social skills and acquire the ability to use

social comparison information to evaluate the self [39]. While holding positive bias is not considered typical in middle childhood (i.e., later elementary school years) it may be more common among children in the earlier phase of this developmental period.

There has clearly been research on the ways in which demographic factors (i.e., sex, ethnicity, and age) and social relationship indicators (i.e., social preference) may influence the likelihood of holding positive bias; however, little work has been done to investigate the ways in which these factors may influence the relationships between bias and socio-emotional outcomes. It is possible that these relationships differ depending on children's demographics or social acceptance levels. In fact, one might expect that positive bias is more problematic for older children given that self-perceptions should become more realistic over time but no studies to date have examined the moderating effects of these child characteristics on the relationships between bias and aggression and bias and depressive symptoms.

Present Study

The present study utilizes a concurrent design to attempt to replicate past research that has established a positive relationship between bias and aggression, and a negative relationship between bias and depressive symptoms. Uniquely, bias will be kept as a continuous measure in the present study but children who hold negatively biased self-perceptions of their social acceptance will not be included in the study sample. The results found using this sample that is restricted to children with bias scores ranging from relatively accurate to overly positive will be compared to results found using the full continuum of bias. A further aim of the current study is to examine the demographic and social competence characteristics that are common among children who hold positively biased self-perceptions. Proposed characteristics for study include children's sex, ethnicity, age, and social acceptance. It is hypothesized that children who hold positive bias, compared to children who hold more realistic self-perceptions, will be more likely to be male, of ethnic minority status, younger, and will be less well-liked by their peers.

The present study adds to the extant research in a number of ways. First, positive bias was measured at two time points during the course of the present study in an effort to assess stable individual differences in positively biased self-perceptions of social acceptance. The notion that the positively biased children in this study are truly prone to overestimation, rather than tested on a particularly self-assured or self-doubting day, is bolstered by using this method. Second, the present study excludes children with negatively biased self-perceptions. By doing so, the investigators are permitted an explicit examination of the relationships between positive bias (relative to more realistic, unbiased self-perceptions) and the socio-emotional outcomes of aggression and depressive symptoms without the influence of those children who have held negatively biased self-perceptions.

Methods

Participants

The present study is based on archival data from a two-wave study [3] that was conducted with the full approval of the Institutional Review Board. The data described in the present study differ from those in David and Kistner [3] because the present study excludes participants on the negative end of the bias spectrum. Additionally, in the present study data were averaged across two time points in an effort to enhance the reliability of assessing individual differences in children's biased self-perceptions. For the purpose of the current study a sub-group of participants that never held negative bias ($n = 366$) was selected from the full pool of participants ($n = 665$). Consistent with work done by Hymel et al. [19], participants were excluded from this study ($n = 299$) if their bias score fell more than .5 of a standard deviation below the mean of the bias scores at either or both time points measured in the present study (described in more detail in a later section). As such, the participants included in the study sample did *not* hold negatively biased self-perceptions at either of the two time points. Of the final sample ($n = 366$), 45 % were male and 55 % were female. The distribution of ethnicity of this sample was 65 % Caucasian, 32 % African American, 1 % Asian, 1 % Hispanic, and 1 % other ethnicity. African American, Asian, Hispanic, and other ethnicity participants were combined to form the "ethnic minority" category with respect to ethnicity. The average age of participants was 9.5 years ($SD = .98$). There were 140 third, 108 fourth, and 118 fifth graders in the sample.

Measures

Actual Acceptance

Sociometric ratings were used to measure each participant's actual social acceptance. Participants were given a roster of student names from their own classroom and were asked to rate on a 5-point scale (ranging from 1 = "do not like at all" to 5 = "like very much") how much they liked each classmate. Ratings were summed, averaged, and standardized within class to form a measure of social acceptance at both Time 1 and Time 2. Peer ratings have

been demonstrated to be reliable and valid indices of social acceptance [40]. Test–retest reliabilities of 4- and 6-week intervals have been reported to be .81 and .84 respectively [41, 42]. Test–retest reliability in the present study was .81 over a 6 months interval.

Perceived Acceptance

Participants were presented with a roster of the same classroom student names and asked to predict the rating they would receive from each classmate. Participants used the same 5-point rating scale they completed for their peers. Rating were summed, averaged, and standardized within class to form a measure of perceived acceptance at both Time 1 and Time 2. Predicted peer ratings directly assess participants' beliefs about how much they perceive themselves to be liked by classmates; therefore, they provide a face-valid assessment of perceived peer acceptance. Test–retest reliability over a 6-month interval has been found to be .77 [43]. Test–retest reliability in the present study was .75 over a 6 months interval.

Bias

Two measures of bias were created by subtracting participants' actual acceptance from their perceived acceptance at both Time 1 and Time 2. Positive values represented over-estimates of peer acceptance, whereas negative values reflected underestimates of peer acceptance. The component scores (i.e., actual and perceived acceptance) were already on the same metric which allowed for the calculation of a raw difference score. This method of measuring bias was selected because it is commonly used in the literature and has demonstrated evidence of reliability and validity [8, 44]. Children's bias scores reflect the difference between their mean acceptance scores across classmates and their mean predicted acceptance by those classmates. The mean of bias was calculated for both time points. Participants were excluded from the study sample if their bias scores were lower than .5 of a standard deviation below the mean of bias at one or both time points. Once the final study sample was obtained, the overall bias score used in the present study was computed by averaging participants' bias scores from Time 1 and Time 2.

Social Preference

Sociometric nominations were used as an alternative method for measuring participants' social acceptance within their respective classrooms at Time 1. Participants were presented with the same roster of student names from their own classroom. First, participants were asked to nominate any three children from the list that they most liked to play with (positive nominations) and three different children from this list that they least liked to play with (negative nominations). To compute the social preference score for each participant, the criteria outlined by Coie et al. [45] were followed. First, the total number of received positive nominations was calculated for each participant and standardized within the classroom to create a total positive nomination score. Second, the total number of received negative nominations was calculated for each participant and standardized within the classroom to create a total negative nomination score. Next, the negative nomination score was subtracted from the positive nomination score to create the social preference score. Higher values represent greater social acceptance among peers within the class. Importantly, social preference and actual acceptance are two different ways of measuring the same construct: social acceptance. As 50 % of the variance in bias is derived from actual acceptance, we chose to include use an alternative measure of social acceptance (i.e., social preference) as an independent variable when examining factors that are related to bias.

Aggression

Participants' level of aggression was assessed using a peer nomination measure [46, 47] that consists of three subscales (i.e., overt aggression, relational aggression, and prosocial behavior). Only the overt and relational aggression subscales were considered in the current study. The overt aggression scale consists of five items related to verbal (e.g., "call others mean names") and physical (e.g., "hit, kick, or punch other kids") aggression. The relational aggression scale consists of five items related to behaviors intended to hurt another peer's relationships (e.g., "when they are mad at a person, they get even by keeping the person from being in their group of friends"). Participants were given a roster of student names from their own class and asked to nominate three classmates who fit each of the behavioral descriptors. For each item, the number of nominations that each child received was summed and divided by the total number of possible nominations. The average number of nominations across all ten overt and relational aggression items was summed, averaged, and standardized within class to form a measure of aggression at Time 2. There is support for the internal consistency reliability of this measure [47]. Cronbach's alpha for the present study was .84.

Depressive Symptoms

Participants' level of depressive symptoms was measured using the Children's Depression Inventory [48] at Time 2. It is a commonly used 27-item child-report measure of the presence and severity of symptoms of depression during

Table 1 Differences between participants excluded and included in the present study

	Total sample ($n = 665$)		Excluded ($n = 299$)		Included ($n = 366$)		t/χ^2	p
	M	*SD*	*M*	*SD*	*M*	*SD*		
Bias Time 1	−.05	.79	−.63	.57	.42	.61	−22.79	**<.001**
Bias Time 2	.04	.85	−.56	.62	.52	.67	−21.50	**<.001**
Bias (averaged)	−.01	.73	−.59	.41	.47	.55	−28.54	**<.001**
Sex (% male)	46 %	–	47 %	–	45 %	–	.26	.61
Ethnicity (% minority)	30 %	–	25 %	–	35 %	–	7.66	**.01**
Age	9.44	.99	9.39	1.00	9.5	.98	−1.05	.30
Social preference	.35	4.91	1.69	4.65	−.75	4.86	6.56	**<.001**
Aggression	.25	.28	.17	.22	.31	.31	−6.73	**<.001**
Depressive symptoms	9.62	8.51	9.16	7.89	9.99	8.98	−1.27	.20

Differences between the excluded and included participant groups exist for the variables in bold font

the previous 2 weeks. The Children's Depression Inventory has good internal consistency, test–retest reliability, and discriminative validity [49]. Cronbach's alpha for the present study was .67.

Procedure

To recruit the sample, parent permission to participate was solicited from children in the third, fourth, and fifth grades at eight public elementary schools located in rural and suburban areas of northern Florida. Consent was obtained from 665 children. Participants completed the measures described above as part of a larger test battery during two 60-min data collection sessions at Time 1. The two sessions were conducted approximately 1 week apart and at least 3 months into the school year in order to ensure that all students were acquainted with each other. Trained graduate and undergraduate research assistants presented instructions to small groups of children at the start of each testing session and then the participants were allowed to complete the measures at their own pace. Participants were encouraged to respond to all items and they were individually queried about any omitted items. If participants reported that they lacked sufficient information to provide a rating or a nomination, the question was left blank. For the Time 2 data, the same data collection protocol was implemented 6 months after Time 1 data collection ended.

Results

Preliminary Analyses

Prior to conducting analyses, all variables were examined for missing values. Social preference data was missing for one participant. This participant was considered "missing pairwise" and was included in all analyses that did not rely on social preference data.

At Time 1 bias ranged from −.44 to 2.80 and at Time 2 bias ranged from −.38 to 3.46. The range of bias for the final bias score that was averaged across time points was from −.39 to 2.70. Descriptive statistics for the study variables, as well as bias scores at both time points, are compared for the participants who were excluded and included in the final study sample in Table 1. As expected, participants that were included in the study had higher bias than participants that were excluded from the study. In addition, participants that were included had lower social preference and higher aggression than those that were excluded from the study. Finally, a greater proportion of the participants that were included were of ethnic minority status than the participants that were excluded from the study.

Correlations among study variables in the final study sample are presented in Table 2. Bias was significantly correlated with sex and ethnicity such that boys and ethnic minority children held higher positive bias. Bias was also significantly associated with social preference such that less well-liked children held higher positive bias. Finally, bias was significantly correlated with aggression and depressive symptoms such that as bias increased so did the severity of aggression and depressive symptoms.

Positive Bias and Aggression

Hierarchical multiple regression was used to examine the relationship between bias and aggression. Sex, ethnicity, age, and bias were entered at Step 1 and together explained 14.1 % of the variance in aggression, F (4, 360) = 14.74, $p < .001$. Bias was related to aggression above and beyond the effects of sex, ethnicity, and age ($\beta = .19$, $p < .001$) such that more positive bias was associated with higher levels of aggression. Social preference was then added at

Table 2 Correlations between study variables

		1	2	3	4	5	6
1	Bias	–					
2	Sex	−.12*	–				
3	Ethnicity	.30**	.02	–			
4	Age	−.02	−.03	.08	–		
5	Social preference	−.32**	.08	−.01	.12*	–	
6	Aggression	.28**	−.21**	.25**	.02	−.24**	–
7	Depressive symptoms	.13*	−.07	.10	−.03	−.21**	.12*

$N = 366$

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

Step 2 to examine whether the association between bias and aggression would hold once participants' level of actual social acceptance was taken into account. The total variance explained by the model as a whole was 17.3 %, F (5, 359) = 14.99, $p < .001$. The relationship between bias and aggression remained significant once social preference was added as a covariate in the model, $\beta = .13$, $p = .02$.

Positive Bias and Depressive Symptoms

The same hierarchical multiple regression procedure was conducted to examine the relationship between bias and depressive symptoms. Again, sex, ethnicity, age, and bias were entered at Step 1 and together explained 2.5 % of the variance in depressive symptoms, F (4, 360) = 2.28, $p = .06$. The relationship between bias and depressive symptoms trended toward significance above and beyond the effects of sex, ethnicity, and age ($\beta = .10$, $p = .06$) such that positive bias was associated with higher levels of depressive symptoms. Social preference was then added at Step 2 to examine whether the trending association between bias and depressive symptoms would hold once participants' level of actual social acceptance was taken into account. The total variance explained by the model as a whole was 5.6 %, F (5, 359) = 4.28, $p = .001$. The strength of the relationship between bias and depressive symptoms decreased once social preference was added as a covariate in the model, $\beta = .04$, $p = .49$.

Group Characteristics

A multiple regression analysis was performed to examine the unique impact of the proposed factors (i.e., sex, ethnicity, age, and social preference) on bias. The full model containing all four predictors accounted for 20.1 % of the variance in bias, F (4, 360) = 22.67, $p < .001$. As shown in Table 3, three of the four proposed independent variables made a unique contribution to the prediction of bias. Being a boy, a member of an ethnic minority, and lower social preference were all uniquely associated with greater positive bias.

Table 3 Full model for characteristics that predict bias

	B	*S.E.*	*β*	*t*	*p*
Sex	−.12	.05	−.11	−2.27	.02
Ethnicity	.36	.06	.31	6.46	<.001
Age	−.01	.03	−.01	−.27	.79
Social preference	−.04	.01	−.30	−6.37	<.001

Moderating Effects

To be maximally inclusive in the investigation of the relationships between bias and the socio-emotional outcomes of aggression and depressive symptoms, the moderating effects of the proposed child characteristics (i.e., sex, ethnicity, age, and social preference) were examined without a priori hypotheses. Four separate multiple regression models were tested to examine whether the relationship between bias and aggression was moderated by sex, ethnicity, age, or social preference. Results indicated a two-way interaction between bias and sex ($\beta = -.30$, $p = .047$). Further analyses indicated that for boys, positive bias was associated with higher levels of aggression ($\beta = .40$, $p < .001$) but this same relationship only trended toward significance for girls ($\beta = .14$, $p = .07$).

There is evidence to suggest that boys are more overtly aggressive than girls but sex differences are more modest with respect to relational aggression [50]. As such, an exploratory analysis testing the bias by sex interaction was conducted separately for overt and relational aggression. Bias predicted both overt and relational aggression but the two-way interaction between bias and sex was significant only for the prediction of overt aggression ($\beta = -.31$, $p = .03$). Further analyses indicated that for boys, positive bias was associated with higher levels of overt aggression ($\beta = .33$, $p < .001$) but this same relationship was non-significant for girls ($\beta = .12$, $p = .09$).

Results of the other moderation analyses demonstrated no significant moderation effects of sex for the relationship between bias and depressive symptoms. In addition, no moderation effects were found for ethnicity, age, or social preference for the relationships between bias and aggression or bias and depressive symptoms.

Full Continuum of Bias

In order to determine whether results from the restricted sample (limited to children whose bias scores ranged from unbiased to positively biased) differ from what would have been found if the full continuum of bias was utilized all analyses were conducted using the full sample of participants. With respect to aggression, virtually the same pattern of results was demonstrated when using the full sample. Bias was related to aggression above and beyond the effects of sex, ethnicity, age and social preference ($\beta = .24$, $p < .001$) such that more positive bias was related to higher levels of aggression. The only difference between results for the full and restricted samples was found for moderating variables. In the full sample sex no longer moderated the relationship between bias and aggression but social preference did ($\beta = -.08$, $p = .03$). Further analyses indicated that bias is more strongly related to aggression for children with low social preference ($\beta = .35$, $p < .001$) than for children with high social preference ($\beta = .08$, $p < .001$). Neither ethnicity nor age moderated the relationship between bias and aggression.

With respect to depressive symptoms, similar but not identical, results were found using the full sample. The relationship between bias and depressive symptoms reached significance above and beyond the effects of sex, ethnicity, and age ($\beta = .09$, $p = .02$) such that positive bias was associated with higher levels of depressive symptoms. Again, the strength of the relationship between bias and depressive symptoms was reduced to non-significance once social preference was added as a covariate in the model, $\beta = .02$, $p = .45$. None of the proposed factors moderated the relationship between bias and depressive symptoms in the full sample.

With respect to the traits that characterize children who are likely to hold positive bias, ethnicity ($\beta = .21$, $p < .001$) and social preference ($\beta = -.36$, $p < .001$) remained uniquely associated with positive bias using the full sample. Sex was no longer associated with positive bias ($\beta = -.02$, $p = .53$) using the full sample.

Discussion

Biased self-perceptions of social acceptance are potentially important for understanding children's risk for significant developmental problems related to peer relationships [51] and socio-emotional functioning [3, 25]. The present study sought to corroborate findings related to the association between positive bias and aggressive and depressive outcomes by comparing children who held positive bias with their peers who held more realistic self-perceptions. A link between positive bias and aggression was supported while a protective function of positive bias with respect to depressive symptoms was not. In addition, the present study found support for research suggesting positive bias is more common among boys, members of an ethnic minority, and children with social difficulties.

The present study excluded children who fell toward the negative end of the bias continuum. Findings related to differences between participants that were included in the study and those that were excluded from the study came out as expected based on past research on positive bias. A greater proportion of the participants that were included were of ethnic minority status than the participants that were excluded. This makes sense given research suggesting that African American children tend to have higher self-esteem than their other ethnicity peers [32]. In addition, participants that were included had lower social preference and higher aggression than those that were excluded from the study. These findings are to be expected if positive bias is truly related to social preference and aggression, as has been found in past studies and was hypothesized in this study.

Positive bias was related to elevated aggression above and beyond the effect of social preference, as well as the other child characteristics associated with positive bias (i.e., sex, ethnicity, and age) that could be considered confounds to the relationship. As such, it can be more confidently concluded that it is truly positive bias that is related to aggression and not the particularly non-aggressive negatively biased children who are driving that relationship. Findings for the restricted and full samples were the same with the exception of two findings pertaining to moderating variables. Interestingly, social preference moderated the bias-aggression link in the full sample, but not the restricted sample, lending some support to the disputed overestimation theory (i.e., aggression primarily exists for children who are positively biased and who experience social difficulties). This discrepant finding may be due to less power in the restricted sample to detect a moderating effect of social preference. Alternatively, it is possible that the findings of moderation are somehow carried by the presence of negatively biased children in the sample (e.g., social preference scores were significantly higher in the excluded sample).

Positive bias was more strongly associated with aggression among boys relative to girls. Research on sex differences in aggression has shown that boys tend to be more aggressive than girls in middle childhood [52]

especially with respect to overt aggression [50]. Sex differences with respect to relational aggression in middle childhood are more modest with a slight preference for enactment on the part of girls [44, 50]. In line with these developmental patterns of aggression, positively biased boys exhibited more overt aggression than positively biased girls but sex did not play a role in the relationship between positive bias and relational aggression. While positive bias is related to both forms of aggression it may be a particularly important target for intervention for boys. Our results, however, found no support for moderating effects of ethnicity or age in either the restricted or full sample, suggesting that positive bias is associated with aggression across ethnic groups and the age span investigated in this study.

Importantly, results of this study offer no support for the hypothesis that positive bias acts as a protective factor against depression. In fact, contrary to this hypothesis, positive bias was marginally related to higher levels of depressive symptoms but this trend was eliminated when we controlled for the degree to which children were socially accepted by peers. Past research that has suggested a protective link between bias and depressive symptoms [6, 25] used bias as a continuous measure, and thus included children who held negative bias. Given that children who hold negative bias are at greater risk for elevated depressive symptoms [26], it may be the case that the inverse relationship between bias and depressive symptoms was carried by the negatively biased children having such high depression levels and that depression levels of positively biased children may not have differed much from their peers whose bias scores fell in the typical range. Interestingly, in the full sample, positive bias was associated with higher levels of depressive symptoms, but again, this relationship was no longer significant once social preference was taken into account. These results highlight the importance of including social preference in analyses examining the relationship between positive bias and depressive symptoms and may help to explain inconsistent results of prior research. Together, the findings from the present study lend support to view that that positive bias may be a risk factor for aggression but not to the hypothesis that it acts as a protective factor for depressive symptoms.

One of the goals of this study was to identify characteristics of children most likely to hold positively biased of their social acceptance. Our results, combined with past research that suggests girls are able to more accurately assess which of their classmates like them [14], add weight to the idea that boys may be more likely to hold positive bias than girls [53]. One possible reason for this finding is that the nature of girls' play pattern (i.e., dyadic, verbally communicative) may allow them greater social feedback on which to base their self-perceptions than boys' play patterns (i.e., group-based, activity-focused). In addition, it is possible that boys are socialized to be more confident and positive about their abilities and acceptance than girls [54, 55]. Finally, it has been suggested that young children do not have the cognitive maturity to determine whether their self-perceptions are realistic [56]. It is possible that boys are slightly behind girls in their maturational development during middle childhood and this contributes to the reason boys are more likely to hold positive bias than girls.

Ethnic minority children had positively biased perceptions of acceptance corroborating prior research [3, 27]. It is beyond the scope of this study to draw any conclusions about the reasons for this ethnic group difference but prior research suggests that parental socialization [29, 32] and peer play patterns [57, 58] may contribute to more positively biased views of social acceptance among ethnic minority children. Regardless of the reason for this group difference, positive bias was associated with elevated aggression for minority and non-minority children and thus greater positive bias among ethnic minority children warrants attention. In the present study, the ethnic minority group was comprised almost exclusively of African American children (i.e., 119 out of 128). As such, the results of this study may not generalize to minority children of other ethnicities.

Not surprisingly, children who were less well-liked by their peers held greater positive bias. The degree to which this finding reflects a methodological artifact (i.e., actual acceptance, which is used to form the bias variable, and social preference both assess the degree to which children are liked/disliked by peers) or other factors is open to question. Children who are disliked among their peers tend to have fewer opportunities to socialize, and as such, have less social information available to use when determining their social standing. This may make it more difficult for disliked children to accurately predict their social acceptance. With respect to positive bias, it is possible that some disliked children suffer from social information processing deficits that lead them to interpret any attention from their peers as positive attention (e.g., acting silly and disruptive in class).

Prior research has demonstrated that children who were characterized as "unpopular due to behavioral problems" reported higher self-perceived social competence than did children who were of average social preference and children who were "unpopular due to shyness" [36], suggesting that it is being disliked *and* having poor behavioral conduct that puts children at risk for positive bias. An alternative explanation is that being disliked and holding positive bias puts children at risk for misbehaving in class. Further study of the mechanisms linking peer acceptance, positive bias and aggression is needed with an emphasis on prospective studies that permit testing directional

hypotheses. Examination of prospective relationships between social preference, positive bias, and aggression is needed to determine the directionality of those associations. It is possible that holding positive bias puts children at risk for being both disliked and aggressive. More research is needed in order to determine whether positive bias is causal risk factor for these developmental outcomes.

Notably, in the present study children's age was not significantly related to bias. This middle childhood age group (roughly ages 9–11) was selected because this is a developmental period when stable individual differences in bias are thought to emerge [2]. Prior to this age range positive bias is more normative and would lead to little variation in the degree to which children overestimate their abilities. The present study was interested in children who maintain positive biases beyond the ages when it is common. The fact that age was unrelated to bias in this sample suggests that there is little developmental change in positive bias in this restricted age span.

The present study has a few limitations that should be acknowledged. First, the decision to exclude participants who held especially negatively biased self-perceptions resulted in a decreased sample size. This method cost some statistical power but also allowed for the ability to separate the effects of positive bias from the effects of negative bias when considering the socio-emotional outcomes of aggression and depressive symptoms. Second, measures of social preference, actual acceptance, and aggression were all gathered using peer-report methods. It is possible that the relationship between bias and aggression was artificially strengthened due to the shared method variance of these measures.

The difference score method of measuring bias has recently received criticism because it does not account for the extent to which children's actual social acceptance (i.e., one of the bias score component variables) influences the relationship between bias and an outcome measure [38]. This criticism is not problematic in the present study because social preference was controlled in all analyses that involved use of the bias score. Additionally, the calculation of a bias score has been called into question because it is perhaps no more informative than using separate measures of actual and perceived acceptance in a regression model [59]. Difference scores were chosen to represent bias in the present study due to the notion that "positive bias" should reflect self-views that are higher than would be expected given the child's actual performance. A difference score represents that discrepancy in one variable that is easy to interpret, with positive numbers representing over-estimation of social acceptance and negative numbers representing under-estimation.

In conclusion, the current study replicated and bolstered evidence that it *is* truly positive bias is that is related to aggression and provided some caution against the idea that positive bias is a protective factor with respect to depressive symptoms. However, there are still many ways in which our understanding of the relationships between bias and the socio-emotional outcomes of aggression and depressive symptoms can be refined and clarified. Longitudinal study designs, especially those that utilize multiple time points over years, can be used to address questions of directionality and causality that cannot be answered using concurrent designs. Future studies may also wish to consider questions such as "how biased is too biased?" For example, perhaps it is the case the holding *some* positive bias is protective for children's socio-emotional well-being but there is a threshold at which bias is extreme enough to be problematic. Another possibility is investigating further into whether positive bias is problematic for everyone or just certain children. It is possible that child characteristics other than those examined in the present study (e.g., intelligence) may moderate these relationships. Future research may also wish to investigate under what social circumstances it is either beneficial or problematic to hold positive bias (e.g., when joining a new social circle).

Summary

This study examined whether positively biased self-perceptions of social acceptance place children at risk for exhibiting aggressive behavior and protect children from developing depressive symptoms. Children who fell at the negative end of the bias spectrum were excluded from this sample in order to more clearly determine the relationship of positive bias with outcomes. Our results suggest that being a boy, a member of an ethnic minority, and having low social preference increases the chances of a child holding positive bias. In this study, positive bias contributed to aggression beyond the effects of social preference and this relationship was especially strong for boys. However, positive bias was not found to be protective against depressive symptoms. Support for idea that positive bias is a risk factor for aggression was strengthened while no support was found for the notion that positive bias could be protective against depressive symptoms.

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