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Authors

Becker, Stephen P
McBurnett, Keith
Hinshaw, Stephen P
[et al.](#)

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Negative Social Preference in Relation to Internalizing Symptoms Among Children with ADHD Predominantly Inattentive Type: Girls Fare Worse Than Boys

Stephen P. Becker,

Department of Psychology, Miami University; Division of Behavioral Medicine and Clinical Psychology, Cincinnati Children's Hospital Medical Center 90 North Patterson Avenue, Oxford, Ohio 45056

Keith McBurnett,

Department of Psychiatry, University of California, San Francisco, UCSF-LPPI CAS Rm 217, 401 Parnassus Ave, San Francisco, California 94143

Stephen P. Hinshaw, and

Department of Psychology, University of California, Berkeley Berkeley, CA

Linda J. Pfiffner

Department of Psychiatry, University of California, San Francisco San Francisco, CA

Stephen P. Becker: beckersp@miamioh.edu; Keith McBurnett: keithm@lppi.ucsf.edu; Stephen P. Hinshaw: hinshaw@berkeley.edu; Linda J. Pfiffner: Lindap@lppi.ucsf.edu

Abstract

Objective—Despite distinct peer difficulties, less is known about the peer functioning of children with attention-deficit/hyperactivity disorder (ADHD) predominantly inattentive type (ADHD-I) in comparison to the peer functioning of children with ADHD combined type. Our purpose was to examine whether child sex moderated the relations between negative social preference and internalizing/externalizing problems in children with ADHD-I.

Method—Participants included 188 children diagnosed with ADHD-I (110 boys; ages 7–11; 54% Caucasian). Teacher ratings of the proportion of classmates who “like/accept” and “dislike/reject” the participating child were used to calculate negative social preference scores. Children, parents, and teachers provided ratings of anxious and depressive symptoms, and parents and teachers provided ratings of externalizing problems.

Results—Boys and girls did not differ on teachers' negative social preference scores. As hypothesized, however, the relation between negative social preference and internalizing symptoms was moderated by sex such that negative social preference was consistently and more strongly associated with internalizing symptoms among girls than in boys. In terms of externalizing problems, negative social preference was associated with teacher (but not parent) ratings, yet no moderation by child sex was found.

Conclusions—Negative social preference is associated with teacher-report of externalizing problems for both boys and girls with ADHD-I, whereas negative social preference is consistently associated with girls' internalizing symptoms across child, parent, and teacher ratings. Implications for future research and interventions are discussed.

Keywords

ADHD; Anxiety; Comorbidity; Depression; Externalizing Problems; Peer Functioning; Sex Differences; Social Functioning

Children with attention-deficit/hyperactivity disorder (ADHD) experience a wide range of long-lasting impairments (Lee, Lahey, Owens, & Hinshaw, 2008), including pervasive difficulties in their social relationships. Compared to non-diagnosed youth, children with ADHD experience greater impairment in their relationships with peers, parents, and teachers (Becker, Langberg, Vaughn, & Epstein, 2012), fewer dyadic friendships (Blachman & Hinshaw, 2002; Hoza et al., 2005b), friendships of poorer quality (Bagwell et al., 2001; Normand et al., 2001), and less social competence (Greene et al., 2001). Further, the social impairments of children with ADHD are particularly difficult to treat (Hoza, 2007; Pfiffner, Calzada, & McBurnett, 2000). Importantly, however, in studies examining the peer/social functioning of children with ADHD, much of the extant research has been conducted with children with ADHD-Combined Type (ADHD-C). It is particularly important to study the peer functioning of children with ADHD-Predominantly Inattentive Type (ADHD-I) as available research suggests that children with ADHD-I have distinct peer problems compared to children with ADHD-C.

Whereas children with ADHD-C tend to lack self-control and display aggression, children with ADHD-I tend to be withdrawn and underassertive (Barkley, DuPaul, & McMurray, 1990; Hinshaw, 2002; Hodgins, Cole, & Boldizar, 2000; Maedgen & Carlson, 2000; Solanto, Pope-Boyd, Tryon, & Stepak, 2009). For example, Hodgins et al. (2000) found that boys with either ADHD-I or ADHD-C received lower social preference scores than typically developing boys. Yet whereas boys with ADHD-C were rated by their peers as more likely to start fights and arguments, boys with ADHD-I were more likely to be rated by their peers as being shy and were observed to be more socially withdrawn. Laboratory-based tasks also suggest that children with ADHD-I have particular difficulties with attending to relevant social cues and actively engaging in social interactions (Mikami, Huang-Pollock, Pfiffner, McBurnett, & Hangai, 2007).

These results suggest that the peer rejection experienced by children with ADHD-I may be related to passivity and withdrawal as opposed to intrusive, annoying behaviors or aggression. Even though children with ADHD-C are more likely than children with ADHD-I to be actively rejected by their peers (Gaub & Carlson, 1997, 2001; Hinshaw, 2002; Maedgen & Carlson, 2000; Mikami & Hinshaw, 2003), those with ADHD-I are not unaffected. Both children with diagnosed ADHD-I and those with clinically elevated inattentive symptoms experience lower social preference scores and higher rates of peer rejection than typically developing youth (Bellanti, Bierman, & Conduct Problems Prevention Research Group, 2000; Gaub & Carlson, 1997; Hinshaw, 2002; Hodgins et al., 2000; Maedgen & Carlson, 2000; Mikami & Hinshaw, 2003). Even children with subclinical attention problems receive more negative peer nominations than comparison children (Rielly, Craig, & Parker, 2006), and observed inattention is significantly associated with sociometric ratings of peer rejection (Mrug, Hoza, Pelham, Gnagy, & Greiner, 2007). Because over half of children with ADHD-I are socially impaired (Gaub & Carlson, 1997), it is critical to examine the effects of negative peer regard in samples of children with ADHD-I.

Negative Social Preference, Psychosocial Adjustment, and Sex Differences

Peer problems are detrimental for child development and are associated with a wide range of adverse outcomes in community and school-based samples including externalizing and internalizing problems (Bell-Dolan, Foster, & Christopher, 1995; Bierman, 2004; Hymel, Vaillancourt, McDougall, & Renshaw, 2002; Parker & Asher, 1987; Parker, Rubin, Erath, Wojslawowicz, & Buskirk, 2006). Such findings hold even when baseline levels of such problem behavior are controlled, strongly suggesting independent effects of peer problems on outcomes. Similar findings have been reported in samples of children with ADHD. For example, in a cross-sectional study of girls with and without ADHD, Mikami and Hinshaw (2003) found that peer rejection was associated with increased aggressive and internalizing behaviors. Although longitudinal findings are more mixed (e.g., Mikami & Hinshaw, 2006), some studies with ADHD samples show peer rejection in childhood to be prospectively associated with externalizing and internalizing problems (Lee & Hinshaw, 2006; Mrug et al., 2012). Therefore, the available research draws attention to poor peer relations as a risk factor for concurrent and possibly prospective externalizing and internalizing problems among youth with ADHD.

Although peer problems are clearly detrimental for both boys' and girls' functioning (Hymel et al., 2002; Parker et al., 2006), the association between peer problems and internalizing problems may be particularly evident among girls. Girls who experience peer neglect are at heightened risk for depression (Kupersmidt & Patterson, 1991). Likewise, by adolescence girls are more likely than boys to display elevated rates of internalizing problems, in part due to girls' distinct interpersonal vulnerabilities (Cyranski, Frank, Young, & Shear, 2000; Leadbeater, Kuperminc, Blatt, & Hertzog, 1999). Girls' peer groups in middle childhood tend to be smaller and more exclusive than those of boys (Daniels-Bierness, 1989; Rose & Rudolph, 2006), and girls are more likely than boys to anticipate sadness in response to peer rejection (Reijntjes, Stegge, Meerum, & Terwogt, 2006) and to blame themselves for social difficulties (Rudolph, 2002). Moreover, girls who experience peer-group difficulties are more likely than boys to suffer repercussions in other important peer domains such as the withdrawal of friendship support (Crick, 1996). Such "spillover" effects may be linked to increases in depressive symptoms among girls (Prinstein & Aikins, 2004). These effects can be long-lasting: Modin and colleagues (2011) found that low peer status in childhood was associated with much higher risk for women's (but not men's) internalizing symptoms 30 years later. Therefore, we hypothesized that the relation between negative social preference and internalizing symptoms in children diagnosed with ADHD-I would be stronger for girls than for boys.

In comparison to internalizing problems, it is less clear whether the association between negative social preference and externalizing problems differs between boys or girls with ADHD. It is possible, in fact, that the relation between negative social preference and externalizing problems is stronger for boys in comparison to girls. In line with this possibility, DeRosier, Kupersmidt, and Patterson (1994) found that peer rejection contributed to subsequent externalizing problems for both boys and girls but that the relation was stronger for boys than for girls. However, other research reveals that child sex does not moderate the association between peer problems and externalizing problems, with peer difficulties contributing to subsequent externalizing behaviors relatively equally for both boys and girls (Dodge et al., 2003; Fergusson et al., 1999; Laird, Jordan, Dodge, Pettit, & Bates, 2001; Miller-Johnson et al., 2002). Therefore, in line with these studies, we hypothesized that negative social preference would be positively associated with externalizing problems for children with ADHD-I but that this relation would not significantly differ between boys and girls.

The Current Study

Compared to children with ADHD-C, less is known about the adverse effects of negative social preference among children with ADHD-I. For instance, of the available studies, several have included only children with ADHD-C (e.g., Multimodal Treatment Study of ADHD [MTA]; Hoza et al., 2005b), have been limited by relatively small sample sizes of children with ADHD-I (e.g., Hodgens et al., 2000; Maedgen & Carlson, 2000; Mikami & Lorenzi, 2011), or have included children displaying inattentive symptoms but not children with clinical diagnoses of ADHD-I (e.g., Rielly et al., 2006). In the present study we used a large sample of children carefully diagnosed with ADHD-I, including multi-informant methods, to test the hypotheses that the association between negative social preference and internalizing symptoms would be stronger for girls than for boys but that negative social preference would be associated with externalizing problems unmoderated by sex.

Method

Participants

Participants were 188 children (110 boys, 78 girls) diagnosed with ADHD-I between the ages of 7 and 11 ($M = 8.67$, $SD = 1.16$). Participants were recruited from the San Francisco Bay Area (California), and, per caregiver report, approximately half of the participants were Caucasian ($n = 101$), with the remaining children Hispanic ($n = 29$), Asian ($n = 16$), Black ($n = 9$), or multiracial ($n = 33$). All respondents were the primary caregiver, and most were mothers (89%); the remaining were fathers (9%) or others (e.g., grandparent; 2%). For ease of presentation, “parent” will be used hereafter to indicate the primary caregiver. Participants’ annual family income ranged from less than \$10,000 to over \$150,000 ($M = \$85,000$; *Median* = \$101,000–\$150,000). In terms of parent education level, 81% of primary parents reported having completed college.

Procedures

All children were recruited as part of a randomized controlled trial for evaluating the efficacy of a psychosocial treatment for children with ADHD-I. Only pre-intervention baseline data were used for the current study. Most participants were recruited from schools via mailings to school personnel with the remaining participants recruited through pediatricians and child psychiatrists, parent on-line postings, and word-of-mouth. Inclusion criteria were a primary DSM-IV (American Psychiatric Association [APA], 1994) diagnosis of ADHD-I (based on the *Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children* [K-SADS-PL]; Kaufman et al., 1997, see below), IQ ≥ 80 (based on the *Wechsler Intelligence Scale for Children, Version IV* [WISC-IV]; Wechsler, 2003), living with at least one parent for the past year, between ages 7 to 11 and grades 2 to 5, attending school full time in a general education classroom, ability to participate in study groups on the days scheduled, and teacher consent to participate in a school-based treatment. Families of children who were taking non-stimulant psychoactive medication, or planning to initiate or change medication treatment in the near term were excluded, as were children with significant developmental disorders (e.g., pervasive developmental disorder) or neurological illnesses.

Initial screenings included parent and teacher telephone interviews to assess eligibility for demographics, school, and medication status. Those who met basic screening criteria were sent parent and teacher packets containing the ADHD module of the *Child Symptom Inventory* (CSI-4; Gadow & Sprafkin, 2002) and the *Impairment Rating Scale* (IRS; Fabiano et al., 2006) to screen for subjects likely to meet full diagnostic criteria for ADHD-I. The small number of children taking stimulant medication completed a one-week wash-out to

assess behavior and obtain ratings off-medication. On the CSI-4, a symptom was judged to be present if rated “often” or “very often” by either parent or teacher. Cases meeting the following guidelines were invited for a diagnostic visit: (a) at least five independent symptoms of inattention endorsed on the CSI by parent and teacher, (b) five or fewer independent symptoms of hyperactivity and impulsivity endorsed on the CSI by parent and teacher, and (c) evidence of impairment due to inattention as rated by both parents and teachers on the IRS (i.e., at least one area of functioning had to be rated ≥ 3 by each informant; Fabiano et al., 2006). Some cases that narrowly missed this guideline but were otherwise significant for ADHD-I also were invited to a diagnostic visit. Parents provided informed written consent and children provided written assent; study procedures were approved by the Institutional Review Boards of the University of California, San Francisco and the University of California, Berkeley.

To determine diagnostic status, parents were interviewed by a licensed clinical psychologist and were asked about their child’s clinical and developmental history and administered modules from the K-SADS-PL (Kaufman et al., 1997) assessing ADHD, oppositional defiant disorder (ODD), conduct disorder, anxiety disorders, major mood disorders, and psychoses. Children were assessed by a licensed clinical psychologist or trained clinician (under the supervision of a licensed psychologist) and completed the WISC-IV and questionnaires. All children met full DSM-IV (APA, 1994) criteria for ADHD-I according to the K-SADS-PL. Twenty percent of randomly selected audio-recorded K-SADS-PL interviews were rated by an independent clinician with 100% agreement for an ADHD-I diagnosis ($\kappa = 1.0$). In addition, 6% met criteria for ODD, 7% met criteria for an anxiety disorder, and 1.5% met criteria for a depressive disorder. Descriptively, parents and teachers rated 91% and 95% of children, respectively, as experiencing global impairment on the IRS. Forty-two percent of parents and 50% of teachers rated children on the IRS as impaired in the peer domain specifically. At randomization, 4.5% were taking stimulant medication. Families meeting entry criteria were invited for a second visit during which time parents and children completed remaining research measures. Teachers also completed a battery of questionnaires for children meeting entry criteria. Of the 199 children enrolled in the intervention study, 188 had teacher-reported social preference data and were used in the current analyses.

Measures

Negative social preference—Teachers reported on children’s social preference using the *Dishion Social Acceptance Scale* (DSAS; Dishion, 1990). Specifically, teachers rated the number of classmates who “dislike/reject” and “like/accept” the child using a five-point scale (1 = *almost none, less than 25%*; 5 = *nearly all, over 75%*). Similar to others (e.g., Lahey et al., 2004; Lee & Hinshaw, 2006), we created a negative social preference score by subtracting the reject/dislike rating from the accept/like rating and then reverse-scoring the scale so that higher scores indicate higher levels of negative social preference. This measure of negative social preference has been well-validated (Dishion, 1990), including significant associations with peer sociometric nominations (Lee & Hinshaw, 2006) and sensitivity in differences between children with and without ADHD (Lahey et al., 2004).

Child-report of internalizing symptoms—Children reported on their own anxious symptoms using the *Revised Children’s Manifest Anxiety Scale* (RCMAS; Reynolds & Richmond, 1978). The RCMAS consists of 37 Yes/No items (assessing physiological anxiety, performance anxiety, worry, and social anxiety) that can be summed to create a total anxiety score (*no* = 0, *yes* = 1). Children reported on their depressive symptoms using the *Child Depression Inventory, Second Edition* (CDI-2; Kovacs, 1992). The CDI-2 consists of 28 items that are rated on a three-point scale, with higher scores indicating greater

depressive symptomatology. Both the RCMAS and CDI-2 are well-validated and demonstrate adequate internal consistency ($r = .85$) and test-retest reliability over a 1–4-week period ($r = .85$; Kovacs, 1992; Muris, Merckelbach, Ollendick, King, & Bogie, 2002; Reynolds & Richmond, 1978). The total raw scores of the RCMAS and CDI-2 were used in the present study.

Adult-report of child internalizing and externalizing problems—Parents completed the Parent-Rated Form of the CDI-2 (CDI-2:P; Kovacs, 1992) as a measure of their child’s depressive symptoms. The parent form of the CDI-2 correlates with the child-report version of the CDI ($r_s = .37$ – $.66$ and demonstrates adequate internal consistency ($r = .85$) and test-retest reliability over a one month interval ($r = .75$; Kovacs, 1992; Wierzbicki, 1987). Parents and teachers completed the anxiety, aggression, and conduct problems scales of *Behavior Assessment System for Children* (BASC; Reynolds & Kamphaus, 1992). The BASC demonstrates excellent validity and reliability, with internal consistencies above $.80$ in the normative clinical sample across both the parent and teacher versions of the scales used in the present study (Reynolds & Kamphaus, 1992). Raw scores were used in the present study. Separately for parents and teachers, the aggression and conduct problems scales were averaged to create an externalizing problems score. In addition, the teacher-reported BASC depression scale was used to supplement the parent-reported CDI-2 measure of depressive symptoms.

Data Analysis

First, correlation analyses were conducted to examine whether child sex was bivariate associated with teacher-reported negative social preference and child-, parent-, and teacher-reported psychopathology symptoms. Next, hierarchical multiple regression analyses were conducted to test our primary study aims examining whether the relations between negative social preference and child adjustment were moderated by child sex. Sex (dichotomous) and negative social preference (mean-centered as a continuous variable) were entered at Step 1, and then the interaction of sex and negative social preference (mean-centered) was entered at Step 2. Significant interactions were plotted using procedures outlined by Holmbeck (2002). Specifically, regression equations were calculated separately for boys and girls, and substituted values of one standard deviation below and above the mean for negative social preference were used in each equation in order to produce graphs of the moderated effect.

Results

Preliminary Analyses

For all study variables, absolute values of skewness and kurtosis were below 2.0. Means, standard deviations, and intercorrelations among study variables are displayed in Table 1. Of note, child sex was not significantly associated with negative social preference, externalizing problems, or depression. However, across self-, parent-, and teacher-report measures, girls had higher levels of anxiety than boys. Negative social preference was significantly associated with teacher-reported externalizing problems and depressive symptoms.

Moderation Analyses with Internalizing Outcomes

Hierarchical regression analyses were conducted to examine whether child sex moderated the relations between teacher-reported negative social preference and child-, parent-, and teacher-reported internalizing symptoms. Regression coefficients, standard errors, and t values are displayed in Table 2.

In first considering child-reported anxiety and depression, child sex significantly predicted child-reported anxiety at Step 1, with girls reporting higher levels of anxiety. There was not

a main effect of negative social preference in relation to anxiety. However, a significant negative social preference \times sex interaction emerged in predicting children's anxiety ($R^2 = .04, p = .007$). This significant interaction was plotted and is shown in Figure 1 (top figure). As displayed, although negative social preference was not significantly associated with boys' anxiety ($\beta = -0.15, p = .10$), negative social preference was significantly and positively associated with girls' anxiety ($\beta = 0.23, p = .03$).

A similar model was tested in relation to child-reported depressive symptoms, as summarized in Table 2. As with anxiety, there was not a main effect of negative social preference at Step 1, nor was there a main effect of child sex. Again, a significant negative social preference \times sex interaction emerged in predicting children's depression ($R^2 = .02, p = .047$) (see Footnote 1). As shown in Figure 1 (bottom figure), although negative social preference was not associated with boys' depression ($\beta = -0.02, p = .80$), negative social preference was significantly positively associated with girls' depression ($\beta = 0.27, p = .02$).

Parent-reported internalizing outcomes were examined next. As summarized in Table 2, parents rated girls as being more anxious than boys at Step 1, and the negative social preference \times sex interaction at Step 2 was nonsignificant in predicting parent-reported child anxiety ($R^2 = .007, p = .25$). In contrast, there was not a main effect of child sex in predicting parent-reported child depression, but negative social preference was positively associated with parent-reported child depression at Step 1 (see Table 2). Further, a significant negative social preference \times sex interaction emerged in predicting parent-reported child depression at Step 2 ($R^2 = 0.03, p = .03$). As shown in Figure 2 (top figure), negative social preference was significantly positively associated with parent-reported depressive symptoms for girls ($\beta = 0.33, p = .003$), but not for boys ($\beta = 0.01, p = .89$).

Teachers also rated girls as being more anxious than boys, and there was also a main effect of negative social preference in predicting child anxiety at Step 1 (see Table 2). Further, there was a significant negative social preference \times sex interaction in predicting teacher-reported child anxiety at Step 2 ($R^2 = .02, p = .04$). As shown in Figure 3 (top figure), negative social preference was significantly positively associated with teacher-reported anxiety for girls ($\beta = 0.32, p = .005$), but not for boys ($\beta = 0.02, p = .83$).

As with parent-reported child depression, there was not a main effect of child sex in predicting teacher-reported child depression, but negative social preference was positively associated with teacher-reported child depression (see Table 2). Further, as with child- and parent-reported depressive symptoms, a significant negative social preference \times sex interaction emerged in predicting teacher-reported child depression ($R^2 = 0.05, p = .002$). As shown in Figure 2 (bottom figure), negative social preference was significantly positively associated with teacher-reported depressive symptoms for boys ($\beta = 0.21, p = .02$), but the relation was stronger in predicting girls' depressive symptoms ($\beta = 0.64, p < .001$).

¹Because our primary aim was to examine child sex as a potential moderator of the relations between negative social preference and internalizing/externalizing symptoms, we did not initially consider covariate variables in the regression models as tests of statistical interactions are typically underpowered in nonexperimental research (McClelland & Judd, 1993). However, we did conduct supplemental analyses in order to determine if our results changed when potential covariates were included. Demographic/family characteristic considered as potentially important covariates were: child age, child race/ethnicity (dummy-coded 0 = non-Caucasian and 1 = Caucasian), child IQ, total family income, and highest parent education level. Child age, family income, and parent education were not significantly correlated with any of the child-, parent-, or teacher-reported psychopathology variables (all $ps > .05$). Race/ethnicity and IQ were correlated only with child-reported depressive symptoms ($r = -.24, p = .001$ and $r = -.15, p = .04$, respectively), and so the moderation model for this outcome was re-rerun while including race/ethnicity and IQ as covariates. In the final model, race/ethnicity remained significantly associated with child depressive symptoms ($\beta = -.20, p = .006$), and the negative social preference \times sex interaction term was marginally significant ($\beta = -.22, p = .053$). Consistent with results from the model without covariates, there was a significant relation between negative social preference and self-reported depressive symptoms for girls ($\beta = 0.24, p = .03$), but not for boys ($\beta = -0.04, p = .65$). Therefore, the consideration of various child and family characteristics as potential covariates did not alter our primary findings.

Moderation Analyses with Externalizing Outcomes

Finally, regression analyses were conducted to examine whether child sex moderated the relations between negative social preference and parent- and teacher-reported externalizing problems. As summarized in Table 3, there was not a main effect of sex or negative social preference in predicting parent-reported externalizing problems, and no significant negative social preference \times sex interaction emerged ($R^2 = 0.0004$, $p = .78$).

Finally, there was not a main effect of sex in predicting teacher-reported externalizing problems, although a significant main effect of negative social preference was present (see Table 3). As with parent-reported externalizing problems, no significant negative social preference \times sex interaction emerged in predicting teacher-reported externalizing problems ($R^2 = 0.007$, $p = .19$).¹

Discussion

Our purpose was to examine the relations between negative social preference and internalizing and externalizing problems in a large sample of children diagnosed with ADHD-I. We tested the hypotheses that (a) negative social preference would be more strongly associated with internalizing symptoms for girls than for boys, and (b) negative social preference would be associated with externalizing problems but that this relation would not differ between boys and girls. As hypothesized, the relation between negative social preference and internalizing symptoms was moderated by sex such that negative social preference was more strongly associated with internalizing symptoms among girls in comparison to boys. Significant moderation was found for five of the six internalizing outcomes, with the moderation effect of sex consistent across multiple informants of internalizing symptoms (see Table 2 and Figures 1–3). Specifically, negative social preference was associated with teacher-report of both boys' and girls' depressive symptoms, but the relation was significantly stronger for girls. In contrast, although negative social preference was not associated with self- or parent-reported depression for boys, negative social preference did significantly predict self- and parent-reported depression for girls. Likewise, negative social preference significantly predicted self- and teacher-reported anxiety for girls but not for boys. Therefore, the results rather consistently demonstrate that negative social preference, at least when reported by teachers, is associated with increased internalizing symptoms among girls with ADHD-I, with a nonsignificant relation for boys with ADHD-I. In contrast to internalizing symptoms, child sex did not moderate the relation between negative social preference and externalizing symptoms as reported by either parents or teachers.

It is possible that the distinct features of girls' peer groups may contribute to greater internalizing symptoms in response to negative social regard. For instance, girls' peer groups tend to be smaller and more exclusive than boys' peer groups (Rose & Rudolph, 2006). Girls are more likely than boys to engage in and be the targets of relational aggression (Crick & Grotpeter, 1995), and experiencing relational victimization may be especially harmful to girls' internalizing functioning (Prinstein, Boergers, & Vernberg, 2001). Further, females are more interpersonally-oriented (Feingold, 1994) and physiologically reactive in response to social stress than males (i.e., increases in cortisol; Stroud, Salovey, & Epel, 2002), which may make girls particularly susceptible to the development of internalizing problems after experiencing peer relationship difficulties. Clearly, more studies are needed to examine these potential mechanisms or catalysts in samples of children with ADHD, who are already at risk for both peer difficulties and co-occurring mental health problems.

In contrast, we did not find evidence that child sex moderates the relation between negative social preference and externalizing problems among children with ADHD-I. Interestingly, neither sex nor negative social preference scores were associated with parent-reported externalizing problems. It is possible that parents are less likely than teachers to observe negative social regard in the school context as well as aggressive and hostile behaviors directed towards peers. It is also plausible that shared method variance contributed to a significant relation between teacher-reported negative social preference and teacher-rated but not parent-rated externalizing problems. Although negative social preference was significantly associated with teacher-reported externalizing problems, this relation did not differ for boys and girls. Therefore, although teachers view peer problems as linked more strongly with internalizing symptoms among girls than boys, they did not perceive peer problems as differentially linked to boys' vs. girls' externalizing behaviors. Although we are unaware of studies testing this association in children diagnosed with ADHD-I, our results are consistent with a number of other studies that did not find the effects of peer difficulties on aggressive or disruptive behaviors to differ between boys and girls (Dodge et al., 2003; Fergusson et al., 1999; Laird et al., 2001; Miller-Johnson et al., 2002). It therefore appears that, among children with ADHD-I, negative social preference is related to externalizing problems for both boys and girls whereas negative social preference is also related to internalizing problems in girls but not boys.

The present study used a cross-sectional design, and future research should examine the extent to which child sex affects the degree to which negative social preference contributes to later internalizing and externalizing problems among youth with ADHD-I. To date, it remains unclear if children with ADHD who experience peer rejection are also at increased risk for externalizing and internalizing problems in adolescence. For example, although Mikami and Hinshaw (2006) found both ADHD status and peer rejection predicted girls' internalizing and externalizing behaviors over a five year period, the contributions of both ADHD status and peer rejection were nonsignificant after controlling for childhood levels of internalizing/externalizing problems. Similarly, Lee and Hinshaw (2006) found that childhood peer rejection among girls with and without ADHD predicted negative social preference and suspensions/expulsions five years later (when controlling for other childhood variables), but not adolescent conduct problems, substance use, or internalizing problems. On the other hand, Mrug and colleagues (2012) recently found that peer rejection in children with ADHD-C was associated with delinquency and anxiety six years later (after controlling for baseline, demographic, and psychopathology variables), although the effect of childhood peer rejection was no longer present for these variables at an eight-year follow-up. Given these mixed findings, it remains unclear if peer rejection is an incremental risk factor for prospective adjustment among youth with ADHD. Because studies examining this topic have focused solely on girls (Lee & Hinshaw, 2006; Mikami & Hinshaw, 2006) or youth with ADHD-C (Mrug et al., 2012), there is a clear need for studies that examine the long-term adjustment of children with ADHD-I while also attending to potentially important sex differences.

Limitations and Future Directions

Several limitations of the present study should be noted and point toward important directions for future research. First, our measure of negative social preference was limited to teacher-report methods, and although this approach is valid (Dishon, 1990; Lahey et al., 2004; Lee & Hinshaw, 2006) it will be important for future studies to assess peer functioning using additional methods such as classroom sociometric nominations. In addition, given the cross-sectional design of our study, our results are correlational and temporal relations cannot be assumed. As such, we are unable to tease apart the likely bidirectional nature of peer functioning and internalizing/externalizing problems among

youth with ADHD (see Becker, Luebke, & Langberg, 2012). In addition, although a strength of our study was the use of a large sample of children carefully diagnosed with ADHD-I, we did not include children with ADHD-C and were therefore unable to determine if similar sex effects apply to children with ADHD-C. To the best of our knowledge, studies have not considered our study hypotheses in samples of children with ADHD-C, and so it is unknown if these results are unique to children with ADHD-I or apply to all children with ADHD. We also had relatively few participants who were taking stimulant medication or met diagnostic criteria for comorbid ODD, and the participating children came from families who were relatively affluent. These sample characteristics may potentially limit the generalizability of our results to all children with ADHD-I. Finally, we were unable to examine more nuanced differences between non-Caucasian participants since lower numbers of Hispanic, Asian, Black, and multiracial children required us to dichotomize participants into Caucasian and non-Caucasian groups for the analyses examining covariates.

Conclusion and Considerations for Intervention

In sum, our results suggest that negative social preference is associated with teacher-reported externalizing problems for both boys and girls with ADHD-I as well as internalizing symptoms for girls especially. Unfortunately, intervention efforts for improving the peer acceptance of children with ADHD have yielded less-than-promising results (Hoza, 2007; Pfiffner et al., 2000). Nonetheless, it remains critical to develop and test interventions that seek to improve the peer functioning of children with ADHD. Promising interventions toward this goal have recently been developed, including an intervention specifically tailored to the inattentive type of ADHD, the Child Life and Attention Skills Program (CLAS). This approach includes integrated parent, teacher, and child components addressing the major impairment domains for ADHD-I, including the unique social impairments often experienced by children with ADHD-I. Cross-setting generalization of skill implementation and behavior is emphasized throughout the program and is supported through common rewards, language, and structure. Initial findings suggest that components of CLAS work together to produce positive effects on the social behaviors of boys and girls (Pfiffner et al., 2007), and results from a larger-scale study of CLAS (with the participants in this study) will be forthcoming.

Another promising approach does not focus solely on changing the behaviors of the child with ADHD (and is not specific to ADHD-I) but alternatively seeks to make the peer group more socially inclusive for children with ADHD (Mikami et al., 2012). This may be particularly important for preventing peer rejection or ameliorating the long-term effects associated with negative peer regard. Interestingly, although this intervention approach shows promise over a traditional classroom behavioral management approach in improving the peer functioning of children with ADHD, results to date suggest that the beneficial effects apply to boys more than to girls (Mikami et al., 2012). This pattern may reflect the more exclusive nature of girls' peer groups and higher rates of relational aggression among girls, which could make shifting the reputational biases of girls with ADHD particularly challenging. Still, this approach holds promise for improving the social functioning of children with ADHD and more research is needed to determine how such an approach may be best leveraged in order to be optimally efficacious for both boys and girls.

Finally, in contrast to interventions that aim to increase the inclusiveness of the peer group, an additional approach is to focus on dyadic friendship as a distinct facet of peer functioning that may improve the overall social functioning of children with ADHD (Mikami, Lerner, Griggs, McGrath, & Calhoun, 2010). For example, Becker and colleagues (2013) recently found in a non-diagnosed community-based sample that friendship quality buffered the association between ADHD symptoms and social problems one year later such that ADHD symptoms were no longer associated with social problems for children reporting high levels

of friendship intimacy exchange. This effect was not moderated by child sex, although it should be noted that increasing friendship intimacy could be a double-edged sword among girls especially, since co-ruminative behaviors may contribute to both more positive friendship adjustment as well as more internalizing symptoms (Rose, 2002). Therefore, it remains clear that much more work is needed to not only reduce the peer problems experienced by many children with ADHD, but to also consider how prevention and intervention approaches may affect other domains of adjustment. As demonstrated in the present study, attending to the peer adjustment of girls with ADHD-I may be particularly important for protecting against the development and consequences of internalizing symptoms.

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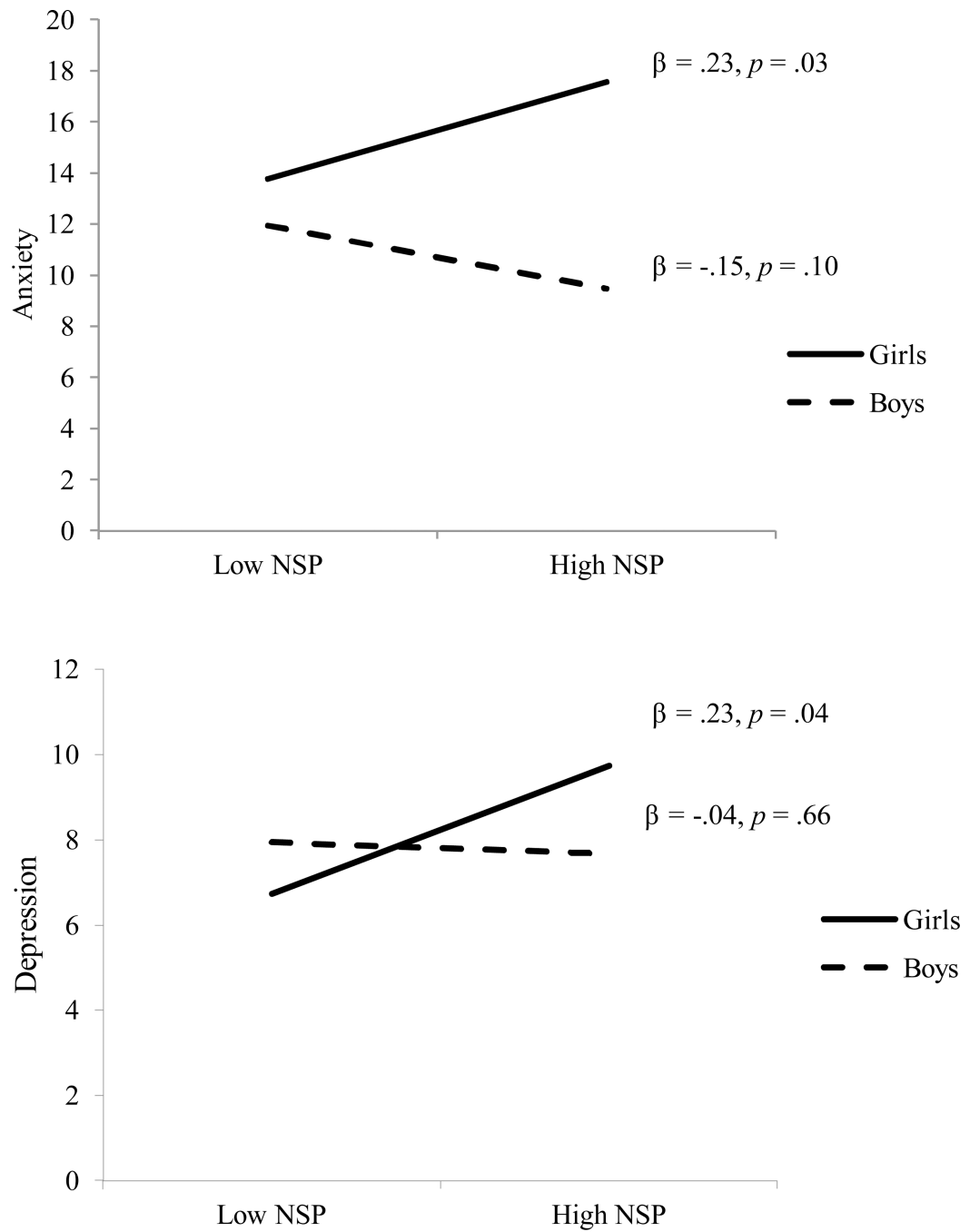


Figure 1. Child Sex Moderates the Relations Between Teacher-Reported Negative Social Preference (NSP) and Child-Reported Anxiety (top figure) and Depression (bottom figure).

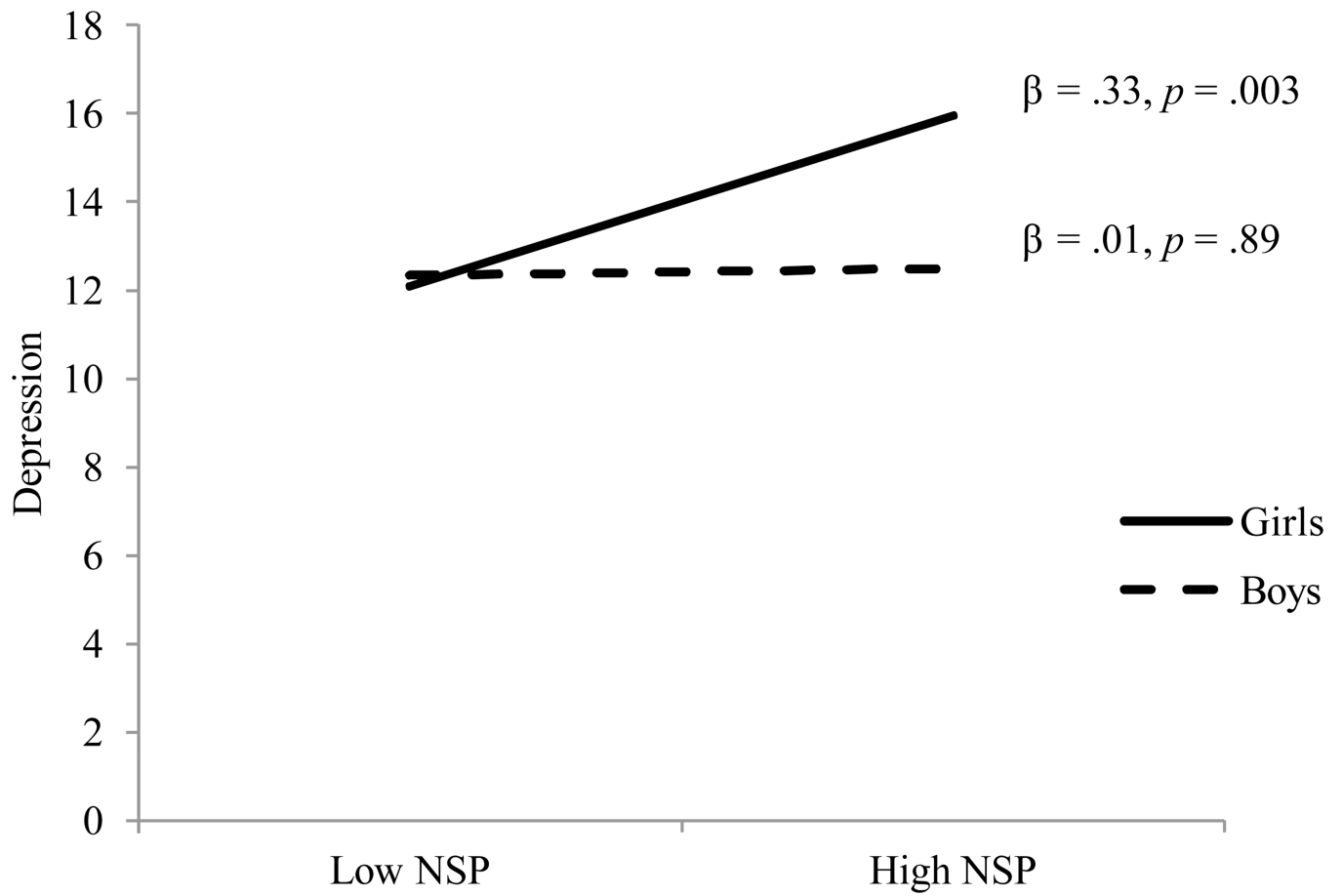


Figure 2.
Child Sex Moderates the Relations Between Teacher-Reported Negative Social Preference (NSP) and Parent-Report of Child Depression.

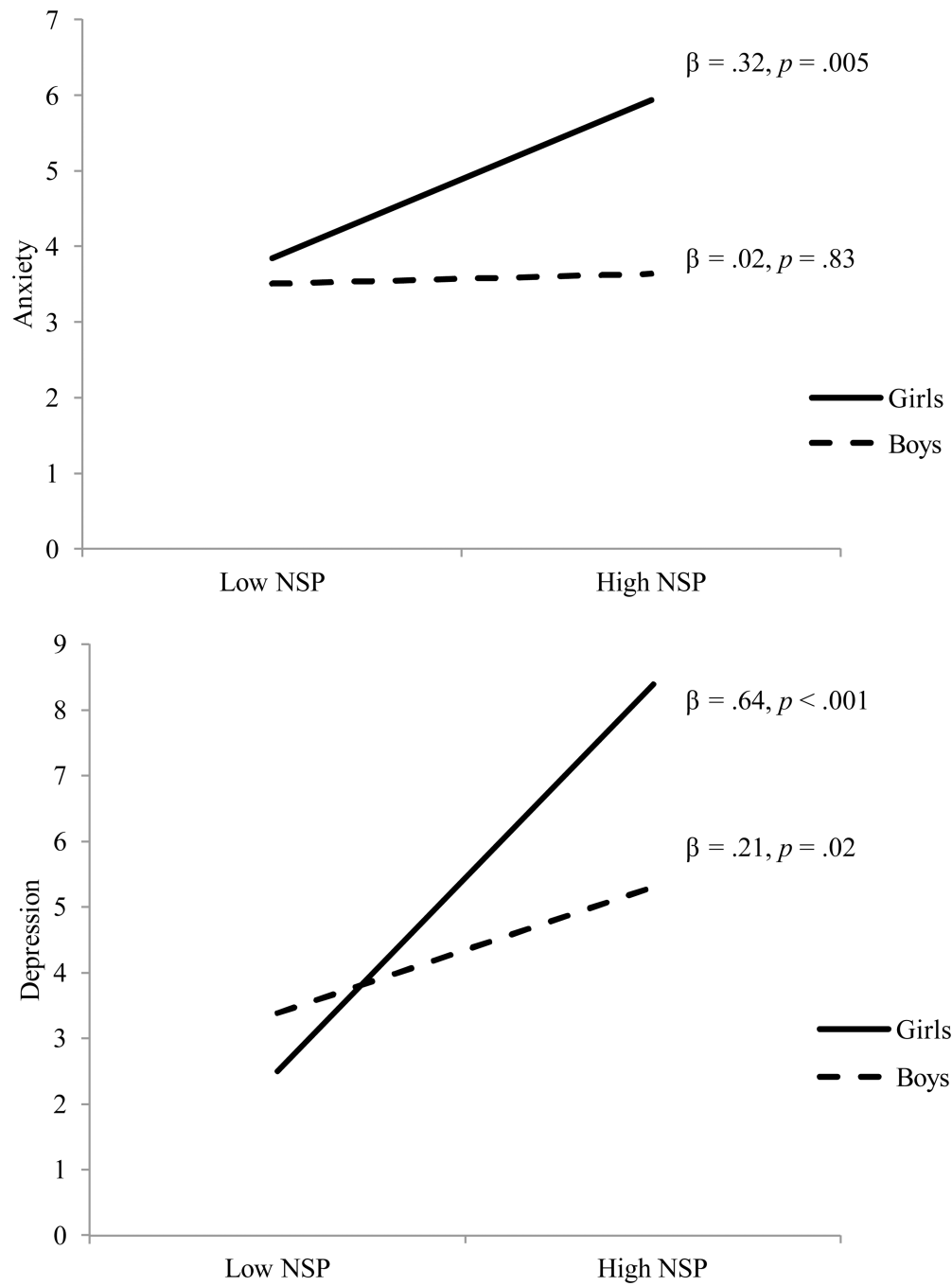


Figure 3. Child Sex Moderates the Relations Between Teacher-Reported Negative Social Preference (NSP) and Teacher Report of Child Anxiety (top figure) and Depression (bottom figure).

Table 1

Means, Standard Deviations, and Intercorrelations of Study Variables

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|----------------------------------|----|-------|---------|--------|------|-------|--------|--------|--------|--------|
| 1. Sex | -- | .04 | -.30*** | -.03 | .08 | -.18* | -.13 | .02 | -.19** | -.10 |
| 2. TR Negative Social Preference | | -- | -.004 | .10 | .12 | -.07 | .14 | .45*** | .14 | .38*** |
| 3. SR Anxiety | | | -- | .62*** | .08 | .20** | .23** | .04 | .05 | .16* |
| 4. SR Depression | | | | -- | .12 | .11 | .25** | .22** | -.10 | .15* |
| 5. PR Externalizing | | | | | -- | .09 | .31*** | .25** | -.04 | .07 |
| 6. PR Anxiety | | | | | | -- | .40*** | -.13 | .26*** | .10 |
| 7. PR Depression | | | | | | | -- | .18* | .28*** | .35*** |
| 8. TR Externalizing | | | | | | | | -- | .20** | .48*** |
| 9. TR Anxiety | | | | | | | | | -- | .61*** |
| 10. TR Depression | | | | | | | | | | -- |
| <i>Mean</i> | -- | -2.23 | 12.71 | 7.96 | 4.73 | 12.87 | 13.06 | 3.38 | 4.11 | 4.77 |
| <i>Standard deviation</i> | -- | 1.95 | 8.23 | 5.55 | 2.87 | 6.40 | 5.84 | 3.62 | 3.31 | 4.62 |

Note. For sex, girls = 0, boys = 1. Externalizing is a composite of conduct problems/aggression composite. CP = conduct problems. PR = parent-report. SR = self-report. TR = teacher-report.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Regression Analyses Examining Sex as a Moderator of the Relation Between Negative Social Preference and Internalizing Symptoms

Table 2

| | Main Effects Model | | | Moderation Model | | | | |
|-------------------------------|--------------------------------------|------|---------|-------------------------------------|------|---------|-------|---------|
| | B | SE | t | B | SE | t | | |
| <i>DV: Child-Report ANX</i> | $F(2,185) = 8.87^{***}, R^2 = .08.$ | | | $F(1,184) = 7.34^{**}, R^2 = .12.$ | | | | |
| Sex | -4.93 | 1.17 | -3.30 | -4.21 | 1.15 | -3.30 | -4.32 | 2.13* |
| Negative Social Preference | .03 | .30 | .01 | .09 | .45 | .23 | | |
| Neg. Social Preference × Sex | -- | -- | -- | -1.60 | .59 | -2.71 | 2.13* | -2.71** |
| <i>DV: Child-Report DEP</i> | $F(2,185) = 1.00, R^2 = .01.$ | | | $F(1,184) = 3.98^*, R^2 = .03.$ | | | | |
| Sex | -42 | .82 | -0.04 | -51 | .82 | -0.04 | | -56 |
| Negative Social Preference | .28 | .21 | .10 | 1.34 | .32 | .27 | | 2.39* |
| Neg. Social Preference × Sex | -- | -- | -- | -84 | .42 | -2.23 | | -2.00* |
| <i>DV: Parent-Report ANX</i> | $F(2,185) = 3.31^*, R^2 = .04.$ | | | $F(1,184) = 1.31, R^2 = .04.$ | | | | |
| Sex | -2.25 | .94 | -1.17 | -2.40* | .94 | -1.18 | | -2.42* |
| Negative Social Preference | -.20 | .24 | -0.06 | -.83 | .37 | .04 | | .34 |
| Neg. Social Preference × Sex | -- | -- | -- | -55 | .48 | -1.13 | | -1.15 |
| <i>DV: Parent-Report DEP</i> | $F(2,183) = 3.60^*, R^2 = .04.$ | | | $F(1,182) = 4.76^*, R^2 = .06.$ | | | | |
| Sex | -1.60 | .86 | -1.14 | -1.87 | .85 | -1.14 | | -1.91 |
| Negative Social Preference | .43 | .22 | .15 | 2.00* | .33 | .33 | | 2.97** |
| Neg. Social Preference × Sex | -- | -- | -- | -95 | .44 | -2.18* | | -2.18* |
| <i>DV: Teacher-Report ANX</i> | $F(2,184) = 5.49^{**}, R^2 = .06.$ | | | $F(1,183) = 4.25^*, R^2 = .08.$ | | | | |
| Sex | -1.30 | .48 | -2.72** | -1.31 | .48 | -2.77** | | -2.77** |
| Negative Social Preference | .24 | .12 | .14 | 1.99* | .19 | .32 | | 2.87** |
| Neg. Social Preference × Sex | -- | -- | -- | -50 | .24 | -2.06* | | -2.06* |
| <i>DV: Teacher-Report DEP</i> | $F(2,185) = 17.43^{***}, R^2 = .16.$ | | | $F(1,184) = 10.28^{**}, R^2 = .20.$ | | | | |
| Sex | -1.07 | .63 | -1.12 | -1.70 | .62 | -1.12 | | -1.79 |
| Negative Social Preference | .91 | .16 | .39 | 5.71** | 1.51 | .24 | | 6.21** |

| | Main Effects Model | | | Moderation Model | | |
|------------------------------|--------------------|-----------|----------|------------------|-----------|----------|
| | <i>B</i> | <i>SE</i> | <i>t</i> | <i>B</i> | <i>SE</i> | <i>t</i> |
| Neg. Social Preference × Sex | -- | -- | -- | -1.02 | .32 | -3.21** |

Note. For sex, girls = 0, boys = 1. For race, non-Caucasian = 0, Caucasian = 1. ANX = anxiety. DEP = depression.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3
Regression Analyses Examining Sex as a Moderator of the Relation Between Negative Social Preference and Externalizing Problems

| | Main Effects Model | | | Moderation Model | | |
|-------------------------------------|--------------------------------------|-----|------------|-------------------------------|-----|------------|
| | B | SE | t | B | SE | t |
| <i>DV: Parent-Report EXT</i> | $F(2,185) = 1.81, R^2 = .02.$ | | | $F(1,184) = 0.08, R^2 = .02.$ | | |
| Sex | .41 | .42 | .97 | .41 | .43 | .97 |
| Negative Social Preference | .17 | .11 | 1.60 | .14 | .17 | .99 |
| Neg. Social Preference \times Sex | -- | -- | -- | .06 | .22 | .30 |
| <i>DV: Teacher-Report EXT</i> | $F(2,185) = 22.81^{***}, R^2 = .20.$ | | | $F(1,184) = 1.70, R^2 = .21.$ | | |
| Sex | .04 | .48 | .08 | .03 | .48 | .06 |
| Negative Social Preference | .83 | .12 | 6.75^{***} | 1.02 | .19 | 5.34^{***} |
| Neg. Social Preference \times Sex | -- | -- | -- | -.32 | .25 | -1.30 |

Note. For sex, girls = 0, boys = 1. EXT = externalizing problems (conduct problems/aggression composite).

* $p < .05.$

** $p < .01.$

*** $p < .001.$