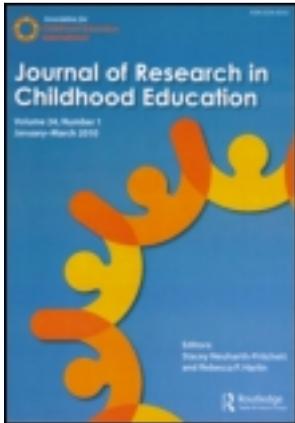


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Teacher/Student Interactions and Classroom Behavior: The Role of Student Temperament and Gender

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The purpose of this study was to examine the relationships of student temperament and gender to disruptive classroom behavior in urban primary grade schools. Teacher reports and classroom observations were used. Forty-four teachers and their 152 students participated. A two-step cluster analysis was conducted with teacher reports on their students' temperaments. Three temperament clusters were identified: industrious, intermediate, and high maintenance. ANOVAs revealed that, as compared to students with other temperaments, children who were high maintenance exhibited significantly higher levels of overt aggression toward others, emotional-oppositional behavior, attentional difficulties, and covert disruptive behavior. Teachers reported more difficulty managing the behavior of high maintenance students and were observed to provide more negative feedback to them compared to those who were industrious. Hierarchical and logistic regression analyses demonstrated that temperament mediated the relationship between student gender and disruptive classroom behaviors. Temperament also mediated the association between gender and teachers' difficulty managing students' covert disruptive behavior. Irrespective of gender, students whose temperaments were high maintenance and intermediate were more likely than industrious students to receive negative teacher

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feedback. Irrespective of students' temperament, teachers were observed to provide more positive feedback to boys than to girls.

Keywords: temperament, disruptive student behavior, teacher/student interactions, school children

Dynamic interactions between teachers and their students occur in elementary school classrooms on a daily basis. Whether engaged in instruction or transitioning between activities, teachers and students have myriad opportunities to interact with each other—a topic that has been the focus of numerous studies (Beaman & Wheldall, 2000; Jones & Dindia, 2004; Kelly, 1988; Sutherland, 2000). Overall, the findings show that elementary schoolteachers provide much more negative than positive feedback to their students. When provided, positive feedback is associated with good academic performance. Students seldom receive positive feedback when meeting their teachers' behavioral expectations (e.g., standing quietly in line). In contrast, negative teacher feedback occurs more frequently and is often precipitated by disruptive student behavior.

Gender is frequently associated with the amount and quality of teacher-student interactions. Two meta-analyses have elucidated under what circumstances teacher feedback differed by student gender (Jones & Dindia, 2004; Kelly, 1988). No gender differences were found in the amount of positive feedback teachers provided their students. Ironically, however, girls who exhibited behavior that teachers valued received less overall attention than boys (Kelly, 1988), although the magnitude of these differences were relatively small ($d = .14$) (Jones & Dindia, 2004). In contrast, boys received more negative feedback with effect sizes ranging from small to moderate ($d = .34$) (Jones & Dindia, 2004). The greater amount of negative feedback that boys received was attributed by Jones and Dindia (2004) to the higher level of disruptive behavior that boys exhibited compared to girls. Teachers used negative feedback in attempting to control their behavior (Broidy et al., 2003; Coie & Dodge, 1998; Jones & Dindia, 2004; Rescorla et al., 2007). This assertion was supported by another study that showed teachers perceived their male students as more difficult to manage than the girls (Childs & McKay, 2001).

The modest effect sizes of gender on teacher/student interactions suggest that other moderating and/or mediating factors may be operating (Brophy & Good, 1974; Jones & Dindia, 2004). A competing explanation is that negative teacher feedback results from disruptive student behavior, regardless of gender. This assertion was supported by Sutherland (2000), who observed that disruptive students, compared to those who were better behaved, had more interactions with their teachers. Likewise, Kelly (1988) found that the difference in the amount of negative feedback boys and girls received was smaller among disruptive students.

Another student characteristic that modifies teacher-student interactions is temperament (Keogh, 2003; Lerner, Lerner, & Zabski, 1985; Pullis & Cadwell, 1982). School-age students whose temperaments were low in task persistence, high in activity, and high in negative reactivity were likely to have negative interactions with their teachers and to exhibit disruptive classroom behavior (Kean, 1995; Prior, Sanson, Smart, & Oberklaid, 2000; Rothbart & Bates, 2006). In contrast, students who were high in task persistence were more likely to experience positive teacher-student relationships (Guerin, Gottfried, Oliver, & Thomas, 1994; Keogh, 2003; Prior et al., 2000). Those whose temperaments were low in activity and negative reactivity, in addition to being high in task persistence, were perceived by their teachers as teachable and competent (Nelson, Martin, Hodge, Havill, & Kamphaus, 1999; Prior et al., 2000; Rothbart & Bates, 2006).

Teachers gave such students more positive feedback (Van de Werfhorst, 1986) and perceived them as requiring less supervision (Pullis & Cadwell, 1982).

Another temperament dimension that influences teacher-student interactions is withdrawal. Several studies have found that students whose temperaments were high in withdrawal were shy and reticent to engage with their teachers compared to their more social classmates (Henderson & Fox, 1998; Rudasill & Rimm-Kaufman, 2009; Sanson, Hemphill, & Smart, 2004).

Although student gender and temperament frequently have been examined in relation to disruptive classroom behavior, less is known about their combined contributions to classroom management and to teacher-student interactions. Moreover, no previous studies have examined these constructs in inner-city schools with populations of economically disadvantaged children at risk for developing disruptive behavior problems (Institute of Medicine, 1994). Understanding how temperament and gender influence student behavior can provide teachers with a framework for interpreting classroom dynamics. Such knowledge may lead to the implementation of teacher strategies that could enhance classroom management. The purpose of this study was to examine the relationships of student temperament and gender to disruptive classrooms behavior in urban primary grade schools. The study had three objectives: (1) to identify temperament profiles among 1st- and 2nd-grade students; (2) to determine whether students with particular temperament profiles differed significantly in their levels of disruptive classroom behavior (both teacher reported and observed), in teachers' reported problems managing their behavior, and in teachers' use of positive and negative feedback; and (3) to determine whether the relationships between student gender and disruptive classroom behaviors, teachers' problems managing disruptive behavior, and teacher positive and negative feedback were mediated by student temperament.

METHOD

Participants and Setting

Participants in the study included 152 students and their 44 teachers in general education 1st- and 2nd-grade classrooms. The six partnering schools were from one urban school district in a large northeastern city in the United States. Department of Education statistics reported that all of the schools were low performing and served predominantly African American families. Approximately 86% of the children in the schools qualified for free or reduced-price lunch programs.

Fifty-six percent of the students were male ($n = 85$) and 44% were female ($n = 67$). Children ranged from age 5 to 9 ($M = 6.61$, $SD = 0.81$). Approximately two thirds of students ($n = 101$) were in the 1st grade and the remaining one third ($n = 51$) were in the 2nd grade. The race/ethnicity of the children was reported as 88% African American ($n = 133$), 9% Hispanic ($n = 14$), and 3% racially mixed ($n = 5$). Fifty-six percent ($n = 86$) of the children lived in single-parent homes, 37% ($n = 56$) lived in a two-parent home, and 7% of the adult respondents ($n = 10$) declined to report their family configuration.

Teacher participants included 29 first-grade and 15 second-grade teachers (41 female, 3 male). Seventy-nine percent of teachers ($n = 35$) reported their race/ethnicity as African American, 7% ($n = 3$) as White, 7% ($n = 3$) as Hispanic, and 7% ($n = 3$) as Asian.

Measurement

Student temperament was assessed using the Teacher School-Age Temperament Inventory (T-SATI), a self-report measure that consists of 36 items rated on a 5-point Likert-type scale (ranging from *never* to *always*) (Lyons-Thomas & McClowry, 2012). The T-SATI is an adaptation of the parent report School-Age Temperament Inventory (SATI) developed by McClowry (1995). Both versions have four dimensions: negative reactivity, task persistence, withdrawal, and motor activity. The T-SATI takes approximately 10 minutes to complete. In previous studies, the Cronbach's alphas for the T-SATI dimensions ranged from .89 to .96 (Lyons-Thomas & McClowry, 2012). As shown in Table 1, the alphas in this study ranged from .70 to .94.

Teachers reported on student disruptive behavior using the Sutter-Eyberg Student Behavior Inventory (SESBI) (Eyberg & Pincus, 1999), which is the teacher version of the Eyberg Child Behavior Inventory (Eyberg & Pincus, 1999). The SESBI consists of 36 items that are each rated along two scales: (1) a 7-point Likert-type intensity scale (ranging from *never* to *always*) in which teachers report the frequency of occurrence of each behavior in the classroom, and (2) a problem scale in which teachers endorse (yes or no) whether they experience difficulty managing each of the stated behaviors. In a prior paper, subscales of the SESBI were identified using principal components factor analysis with varimax rotation (McClowry, Snow, Tamis-LeMonda, & Rodriguez, 2010). Item loadings ranged from .54 to .86 and closely replicated factors identified by Burns and Owen (1990) and Burns, Walsh, and Owen (1995). The derived subscales were as follows: overt aggression toward others, emotional-oppositional behavior, attentional difficulties, and covert disruptive behavior. The highest loading items for each of the four subscales, respectively, include

TABLE 1
Descriptive Statistics of Temperament Dimensions, Disruptive Behavior, Difficulty Managing Disruptive Behavior, and Teacher Feedback

	<i>M</i>	<i>SD</i>	<i>Range</i>	<i>Cronbach's α</i>
Temperament Dimensions				
Negative reactivity	2.46	0.91	1.00–5.00	.94
Task persistence	3.31	0.87	1.11–5.00	.93
Activity	2.46	0.97	1.00–5.00	.90
Withdrawal	2.61	0.64	1.00–4.40	.71
Student Disruptive Behavior				
Overt aggression toward others	2.92	1.59	1.00–6.91	.96
Emotional-oppositional behavior	2.37	1.49	1.00–6.90	.96
Attentional difficulties	3.15	1.50	1.00–6.56	.94
Covert disruptive behavior	2.00	1.17	1.00–7.00	.84
Teacher Difficulty Managing Disruptive Behavior				
Overt aggression toward others	2.69	3.71	0.00–11.00	.93
Emotional-oppositional behavior	1.59	2.90	0.00–10.00	.94
Attentional difficulties	2.43	3.08	0.00–9.00	.91
Covert disruptive behavior	0.50	0.99	0.00–4.00	.74
Observed Student Disruption and Teacher Feedback				
Student disruption	1.77	5.33	0.00–48.00	—
Positive teacher feedback	0.31	0.77	0.00–4.00	—
Negative teacher feedback	1.81	2.77	0.00–18.00	—

teases or provokes other students, cries, has difficulty staying on task, and steals. For each of the intensity subscales, scores were computed as the mean of the component items; problem subscale scores were computed as the total number of behaviors endorsed by the teacher as problematic or difficult to manage. As shown in Table 1, the alphas for the intensity subscales ranged from .84 to .96. The Kuder-Richardson reliability for the problem subscales ranged from .74 to .94.

Observational measures of student disruptive behavior and teacher feedback were obtained using the Primary Classroom Observation Scale (PCOS) (Tamis-LeMonda, Briggs, & Carlson, 2008). The PCOS is a partial time-sampling coding system in which the occurrence of specific student and teacher behaviors are observed in 30-second intervals and then recorded during a 30-second off period. During the one-hour observation period, a total of 24 behaviors are coded, along with a narrative description of teachers' responses to student disruptions.

Prior to conducting the observations, two coders were trained over an 8-week period and reached a reliability level of over 90% agreement (based on a comparison of independent ratings of the same classrooms). Reliability checks continued throughout the duration of the observations conducted for the 44 classrooms; specifically, each of the two coders independently rated every eighth classroom as a reliability check, and was required to maintain over 90% agreement on observed student and teacher behaviors. Percent agreements were calculated separately for each coded behavior, as indicated by the number of times both observers marked the same teacher or student behavior as occurring during the same 30-second coding interval.

Because the focus of this study was on student disruptive behavior and teacher feedback, only variables from the PCOS that pertained to these constructs were examined. Student disruptive behavior comprised five observed behaviors: calling out, roaming around the classroom, annoying other students, being physically aggressive toward other students, and exhibiting oppositional/noncompliant behavior in response to a teacher's requests. The occurrences of two types of teacher feedback were also observed. Positive feedback was coded when a teacher's statement communicated something positive about the child or his/her academic performance (e.g., "You really are working hard") rather than merely reinforcing an answer given in response to the teacher's question (e.g., "That's correct"). Negative feedback was coded when a teacher's statement contained a negative evaluation of the child's ability, work habits, and/or motives (e.g., "You really are not working hard"). For each of these observed variables, the total instances observed were recorded during the coding period and then prorated to reflect rates per hour of observed behaviors. These variables are further described in the appendix.

Procedure

Data for this study were obtained at baseline from teachers and children who were participating in a preventive intervention INSIGHTS into Children's Temperament (McClowry et al., 2010). This study focuses on the classroom component, with data collected from participating teachers and classroom observations conducted prior to the initiation of the 10-week intervention. Recruitment of 1st- and 2nd-grade teachers involved a 30-minute information session conducted at each of the six participating schools. Once a classroom teacher provided informed consent to participate, a variety of strategies were implemented to recruit parents, including sending letters, posting information flyers at the school, making telephone calls, and conducting brief presentations at parent meetings. After a parent agreed to participate, his or her child was asked to give assent.

Teachers completed the T-SATI and the SESBI at baseline on each participating student. Neither the teachers nor the coders were aware of the students' scores on these instruments when the classroom observations were conducted.

Classrooms were observed at baseline by trained coders using the PCOS (Tamis-LeMonda et al., 2008). Observations were conducted during morning lesson time and did not include out-of-classroom time (e.g., lunch, gym), special events (e.g., classroom parties, parent visits), or occasions during which teaching assistants or other staff were responsible for leading the class. Observers stationed themselves in an unobtrusive location that provided a good view of the entire classroom and refrained from interacting with students or engaging in any classroom activities that were taking place during the observation period. Each observer had a timer, pencil, and code sheet for recording student and teacher behaviors. Data on the students and participating teachers were later tallied from the coding sheets for subsequent analyses. Classroom observations averaged 52 minutes in length for each target student ($SD = 33.18$).

RESULTS

Table 1 presents descriptive data on teacher reports of student temperament, teacher-reported occurrences of disruptive behavior and reported difficulty managing disruptive behavior, and observed student disruption and teacher feedback (i.e., positive and negative). Of note, 38% of the students were observed to be disruptive. Fifty-six percent of students received negative teacher feedback, whereas only 20% received positive teacher feedback. Because the distributions of these observational variables were not normally distributed, nonparametric statistics were conducted after dummy coding these behaviors as observed or not observed.

Bivariate associations among all the variables are presented in Table 2. As shown, the temperament dimensions of negative reactivity and activity were positively associated with all teacher-reported measures of disruptive behavior ($r_s = .48 - .82, p_s < .001$) and difficulty managing disruptive behavior ($r_s = .31 - .63, p_s < .01$). Task persistence was negatively related to these same measures ($r_s = -.26 - -.79, p_s < .001$). A similar pattern of associations upheld for measures of observed student disruption and negative teacher feedback. Specifically, student negative reactivity and activity were positively associated with measures of observed student disruption ($r = .26$ and $.25, p_s < .01$) and negative feedback ($r = .35$ and $.30, p_s < .001$), whereas task persistence was negatively associated with these same measures ($r = -.17$ and $-.23, p_s < .05$).

In addition, teachers' reports of student disruptive behaviors were all highly related to teachers' reported difficulty managing these same behaviors ($r_s = .43 - .82, p_s < .001$). Moreover, teachers' reports of student disruptive behaviors were positively associated with observed measures of student disruption ($r_s = .21 - .32, p_s < .01$) and negative teacher feedback ($r_s = .18 - .29, p_s < .05$). Teachers' reports of difficulty managing student disruptive behaviors were similarly associated to these same observed measures. Positive teacher feedback, however, was not associated with any of the study variables.

Profiles of Student Temperament

To examine the construct validity of student temperament profiles among 1st- and 2nd-grade students, a TwoStep Cluster Analysis was conducted with teacher reports on the T-SATI. The

TABLE 2
Intercorrelations Among Student Temperament Dimensions, Disruptive Behavior, Difficulty Managing Disruptive Behavior, and Teacher Feedback

	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Temperament Dimensions														
1. Negative reactivity	-.51***	.59***	.02	.69***	.82***	.66***	.51***	.49***	.63***	.45***	.39***	.26***	.01	.35***
2. Task persistence		-.54***	-.06	-.60***	-.42***	-.79***	-.48***	-.43***	-.26***	-.57***	-.33***	-.17*	.06	-.23**
3. Activity			-.18*	.77***	.58***	.64***	.48***	.52***	.38***	.42***	.31**	.25**	.06	.30***
4. Withdrawal				-.16*	-.04	.04	.04	-.12	-.07	-.01	-.03	-.11	.03	-.13
Student Disruptive Behavior														
5. Overt aggression toward others					.80***	.83***	.68***	.80***	.64***	.66***	.56***	.29***	.03	.29***
6. Emotional-oppositional behavior						.68***	.63***	.61***	.82***	.54***	.55***	.32***	.02	.28***
7. Attentional difficulties							.62	.64***	.52***	.77***	.46***	.21**	-.04	.29***
8. Covert disruptive behavior								.49***	.50***	.43***	.73***	.22**	-.02	.18*
Teacher Difficulty Managing Behavior									.73***	.79***	.60***	.15	.05	.24**
9. Overt aggression toward others										.63***	.69***	.19*	.02	.30***
10. Emotional-oppositional behavior											.55***	.12	.04	.28***
11. Attentional difficulties												.20**	.00	.25**
12. Covert disruptive behavior														
Observed Student Disruption and Teacher Feedback														
13. Student disruption													-.03	.60***
14. Positive teacher feedback														-.06
15. Negative teacher feedback														

* $p < .05$. ** $p < .01$. *** $p < .001$.

TwoStep auto-cluster procedure offers several advantages over traditional clustering techniques (e.g., *k*-means, hierarchical). First, the number of clusters does not need to be selected a priori; instead, the algorithm automatically determines the optimal number of clusters based on a number of criteria (elaborated below). In addition, simulation studies have shown that the combination of distance measures and criterion statistics (such as Bayesian Information Criterion [BIC] or Akaike Information Criterion [AIC]) yield better estimation than either one alone (SPSS, 2001).

The first step of the TwoStep clustering procedure involves the formation of preclusters, to which cases are assigned using a sequential clustering approach (Theodoridis & Koutroumbas, 1999). The BIC or AIC for each number of clusters within a specified range is calculated and used to find the initial estimate for the number of clusters. In the second step, the preclusters are clustered using an agglomerative hierarchical clustering algorithm, producing a range of solutions that differ in the number of derived clusters. The algorithm selects the optimal number of clusters based on the Schwarz's BIC; the solution with the lowest BIC coefficient is deemed optimal. Additional criteria used to index fit include large BIC ratio of change and distance measure statistics.

The clustering procedure was conducted using the four dimension scores derived from the T-SATI: negative reactivity, task persistence, withdrawal, and activity. An initial inspection of the variable-wise importance plots and associated students' *t* statistics revealed that the dimension of withdrawal did not contribute to the discrimination of the clusters (i.e., mean values were virtually identical across all cluster groupings, irrespective of the number of derived clusters). Accordingly, the analysis was repeated using the three temperament dimensions of negative reactivity, task persistence, and activity. Using the above-specified criteria, the auto-clustering algorithm indicated that a three-cluster solution was optimal (BIC = 247.375). As shown in Table 3, the first cluster comprised 35 children (23%) with temperament profiles characterized as industrious (high scores on task persistence and low scores on negative reactivity and activity), a second cluster consisted of 56 children (37%) with temperament profiles characterized as high maintenance (low scores on task persistence and high scores on negative reactivity and activity), the final cluster included 61 children (40%) who did not meet the criteria for either the industrious or high maintenance profiles and who were called intermediate. Based on Bonferroni post-hoc comparisons, students' mean scores on the temperament dimensions of negative reactivity, task persistence, and activity each significantly differed across the three profiles ($p < .001$).

TABLE 3
Analysis of Variance: Temperament Dimensions by Student Temperament Profile

<i>Temperament Dimension</i>	<i>Student Temperament Profile Means (SD)</i>			<i>F</i>
	<i>Industrious</i> (<i>n</i> = 35)	<i>Intermediate</i> (<i>n</i> = 61)	<i>High Maintenance</i> (<i>n</i> = 56)	
Negative reactivity	1.52 (0.46) _a	2.17 (0.38) _b	3.35 (0.71) _c	137.14***
Task persistence	4.38 (0.46) _a	3.25 (0.58) _b	2.71 (0.69) _c	83.99***
Activity	1.43 (0.37) _a	2.29 (0.53) _b	3.30 (0.86) _c	92.95***

Note. Means in the same row with different subscripts are significantly different based on Bonferroni post-hoc comparisons.

*** $p < .001$.

Although the derived solution was objectively determined on the basis of BIC and additional fit criteria, the stability of the cluster groups, as well as the degree to which clusters were heterogeneous on the study outcomes of interest, was examined. Specifically, two steps were taken to validate the three-cluster solution. First, the stability of the cluster groups was cross validated using cut-points derived from a standardized sample of 243 elementary school-age children provided by a national sample of teachers (Lyons-Thomas & McClowry, 2012).

A comparison of the TwoStep cluster groupings with those derived from the standardized cut-off scores revealed a 97.1% concordance for children characterized as industrious, an 83.6% concordance rate for children classified as intermediate, and an 83.9% concordance rate for children classified as high maintenance. However, the pattern of findings for all subsequent analyses was identical when using both methods of classification. Findings using the TwoStep method of clustering are presented in this article.

Finally, because McClowry (2002) found that the proportion of boys and girls differed on temperament profiles, gender also was examined. As illustrated in Figure 1, a significant chi-squared analysis revealed different patterns between girls and boys, $\chi^2(2) = 13.98, p < .001$. Boys were disproportionately represented in the high maintenance profile (71% vs. 29%), whereas girls were overrepresented in profiles characterized by an industrious temperament (69% vs. 31%).

Profiles of Student Temperament in Relation to Classroom Dynamics

The next stage of this study examined how the different temperament profiles were related to classroom dynamics. Specifically, the analyses examined whether students with particular temperament profiles differed significantly on measures of disruptive behavior (both teacher reported

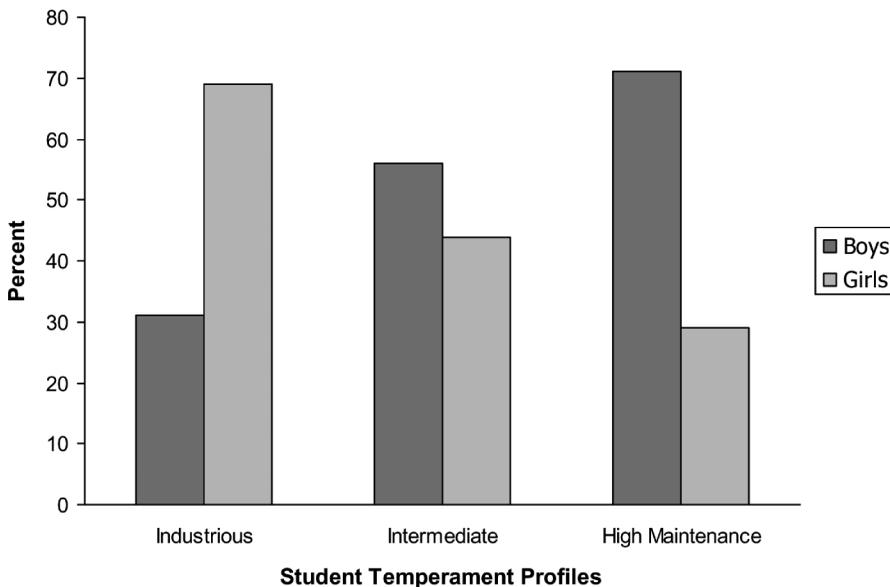


FIGURE 1 Proportions of boys and girls by temperament profiles.

TABLE 4
Analysis of Variance: Student Disruptive Behavior and Teacher Difficulty Managing Disruptive Behavior by Temperament Profile

Outcome	Student Temperament Profile			F
	Industrious (n = 35)	Intermediate (n = 61)	High Maintenance (n = 56)	
Student Disruptive Behavior				
Overt aggression toward others	1.41 (0.45) _a	2.44 (0.88) _b	4.39 (1.43) _c	96.40***
Emotional-oppositional behavior	1.31 (0.51) _a	1.75 (0.69) _a	3.71 (1.56) _b	70.67***
Attentional difficulties	1.51 (0.53) _a	2.90 (0.98) _b	4.44 (1.22) _c	95.31***
Covert disruptive behavior	1.21 (0.32) _a	1.80 (0.89) _b	2.72 (1.37) _c	26.14***
Teacher Difficulty Managing Disruptive Behavior				
Overt aggression toward others	0.34 (1.08) _a	1.72 (2.76) _a	5.21 (4.22) _b	30.64***
Emotional-oppositional behavior	0.29 (1.07) _a	0.52 (1.73) _a	3.55 (3.59) _b	27.67***
Attentional difficulties	0.17 (0.57) _a	1.93 (2.48) _b	4.38 (3.43) _c	29.44***
Covert disruptive behavior	0.06 (0.24) _a	0.39 (0.84) _a	0.89 (1.26) _b	9.16***

Note. Means in the same row with different subscripts are significantly different based on Bonferroni post-hoc comparisons.

*** $p < .001$.

and observed), teachers' reported difficulty managing disruptive behavior, and teacher positive and negative feedback.

ANOVA yielded a significant main effect of temperament profile for each of the four student disruptive behaviors. As shown in Table 4, teachers reported that high maintenance pupils, as compared to industrious and intermediate students, exhibited significantly higher levels of overt aggression toward others, emotional-oppositional behavior, attentional difficulties, and covert disruptive behavior. Further, as compared to industrious children, intermediate students had significantly more occurrences of overt aggression toward others, attentional difficulties, and covert disruptive behavior.

Analyses also examined teachers' reported difficulty managing students' disruptive behavior (also in Table 4). As shown, teachers reported significantly more difficulty managing the behavior of high maintenance students as compared to their industrious and intermediate peers on all four types of disruptive classroom behaviors. Teachers also reported more difficulty handling the attentional difficulties of intermediate children as compared to their industrious counterparts.

As shown in Table 4, chi-square analyses revealed significant differences in disruptive classroom behavior and negative teacher feedback by temperament profile. Specifically, students whose temperaments were characterized as intermediate and high maintenance were disproportionately represented among children exhibiting disruptive behaviors (45% and 45%, respectively) when compared to their industrious peers (10%), $\chi^2(2) = 9.68, p = .008$. In addition, teachers were observed to provide significantly more negative feedback to intermediate (45%) and high maintenance (43%) students as compared to their industrious counterparts (12%), $\chi^2(2) = 13.97, p = .001$. No significant temperament differences were found for positive teacher feedback, $\chi^2(2) = 1.93, p = .381$.

The last stage of the analysis examined whether the relationships between student gender and disruptive classroom behaviors, teacher problems managing disruptive behavior, and teacher

positive and negative feedback were mediated by student temperament profiles. Based on guidelines from Baron and Kenny (1986), hierarchical and logistic regression methods were used. All categorical predictors were dummy coded. Specifically, the first step of models included whether the child was male; students' temperament profile was entered in the second step of models (intermediate, high maintenance, with industrious as the omitted reference group). Estimates from models that included only student gender were compared to model estimates that included student gender and temperament. This allowed for examination of the potential role of temperament as a mediator of the relationship between gender and student disruptive behaviors, teacher difficulty managing behavior, and observed disruption and teacher feedback (positive and negative) in the classroom. Hierarchical linear regression was used in models that examined teachers' reported occurrence of student disruptive behavior and difficulty managing these behaviors. To permit for the examination of marginal effects, logistic regression was used for observed measures of student disruption and teacher feedback in the classroom; for these analyses, each observed measure was coded as having occurred (coded 1) versus not (coded 0) during the one-hour observation period.

As can be seen in the top half of Table 5, a full mediation model was supported. Student temperament mediated the relationship between gender and overt aggression toward others, emotional-oppositional behavior, attentional difficulties, and covert disruptive behavior. That is, for each of the four types of disruptive classroom behaviors, the effect of gender attenuated to nonsignificance when temperament was entered into the model. As compared to their industrious peers, children with high maintenance temperaments were reported by their teachers as exhibiting significantly higher levels disruptive classroom behavior. Moreover, students with temperaments characterized as intermediate exhibited more overt aggression toward others, attentional difficulties, and covert disruptive behavior than children with industrious temperaments.

Also shown in the bottom half of Table 5, student temperament was shown to mediate the relationship between gender and teacher management of covert disruptive behavior. As can be seen, the effect of gender on students' covert disruptive behavior attenuated to nonsignificance when temperament was entered into the model. In addition, temperament was significantly related to teacher difficulty managing students' overt aggression toward others, emotional-oppositional behavior, attentional difficulties, and covert disruptive behavior. Consistently, teachers perceived the behavior of their high maintenance students as more difficult to manage than that of their industrious students. They also perceived more difficulty managing the overt aggressive behavior and attentional difficulties of intermediate children compared to students with industrious temperaments. Gender was not related to teachers' management of these disruptive classroom behaviors.

Finally, logistic regression analyses examined observed measures of students' disruptive behavior and teachers' use of feedback in the classroom. As shown in Table 6, the effect of gender on observed disruptive behavior attenuated to nonsignificance when students' temperament was simultaneously entered into the model. This finding indicates that students' temperament mediates the association between student gender and disruptive classroom behavior. Specifically, students whose temperaments were characterized as intermediate (odds ratio [OR] = 4.02, $p < .05$) and high maintenance (OR = 4.59, $p < .01$) were more likely than their industrious counterparts to demonstrate disruptive behavior.

Also shown in Table 6 are models that examined teachers' observed use of positive and negative feedback in the classroom. Findings of these analyses did not support a mediation model. Instead, analyses revealed that teachers provided significantly more positive feedback to boys

TABLE 5
 Test of Mediation Using Hierarchical Multiple Regression: Student Gender and Temperament in Relation to Teacher Reported Student Disruptive Behavior and Difficulty Managing Behavior

	Overt Aggression Toward Others		Emotional-Oppositional Behavior		Attention Difficulties		Covert Disruptive Behavior	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
<i>Disruptive Behavior</i>								
Gender = Male	-0.95 (.25), -0.30***	-0.29 (.18), -0.09	-0.66 (.24), -0.22**	-0.12 (.18), -0.04	-0.83 (.24), -0.27***	-0.17 (.17), -0.06	-0.63 (.19), -0.27***	-0.31 (.17), -0.13
Temperament profile								
Intermediate		0.96 (.23), 0.30***		0.41 (.23), 0.13		1.35 (.22), 0.44***		0.51 (.22), 0.22*
High maintenance		2.87 (.24), 0.87***		2.35 (.24), 0.76***		2.86 (.23), 0.92***		1.39 (.23), 0.58***
R ² Total	.09	.57	.05	.49	.08	.56	.07	.28
F	14.55***	65.78***	7.68**	47.06***	12.27***	63.85***	11.51***	18.73***
<i>Teacher Difficulty Managing Behavior</i>								
Gender = Male	-1.13 (.60), -0.15	0.00 (.54), 0.00	-0.81 (.47), -0.14	-0.06 (.43), -0.01	-0.87 (.50), -0.14	0.11 (.45), 0.02	-0.33 (.16), -0.17*	-0.16 (.16), -0.08
Temperament profile								
Intermediate		1.38 (.68), 0.18*		0.23 (.54), 0.04		1.79 (.57), 0.29**		0.30 (.20), 0.15
High maintenance		4.87 (.71), 0.63***		3.25 (.57), 0.54***		4.25 (.60), 0.67***		0.77 (.21), 0.38***
R ² Total	.02	.29	.02	.27	.02	.28	.03	.12
F	3.52	20.29***	2.93	18.33***	3.04	19.52***	4.35*	6.41***

Note. Values are unstandardized B weights, standard error of B (in parenthesis), and β coefficients from the final regression equation. Indusrious is the excluded reference category.
 * $p < .05$. ** $p < .01$. *** $p < .001$.

TABLE 6
 Test of Mediation Using Hierarchical Logistic Regression: Student Gender and Temperament in Relation to Observed Disruptive Behavior and Teacher Feedback

	<i>Observed Student Disruption</i>		<i>Observed Positive Teacher Feedback</i>		<i>Observed Negative Teacher Feedback</i>	
	<i>Model 1 Odds Ratio</i>	<i>Model 2 Odds Ratio</i>	<i>Model 1 Odds Ratio</i>	<i>Model 2 Odds Ratio</i>	<i>Model 1 Odds Ratio</i>	<i>Model 2 Odds Ratio</i>
Gender = Male	2.05*	1.58	3.57**	3.72**	1.62	1.18
Temperament profile						
Intermediate		4.02*		0.55		3.98**
High maintenance		4.59**		0.89		4.57**
χ^2 (df)	4.37 (1)*	13.64 (3)**	8.60 (1)**	10.06 (3)*	2.16 (1)	14.32 (3)**
Nagelkerke R^2	.039	.118	.086	.100	.019	.120

Note. Industrious is the excluded reference category.

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

than girls (OR = 3.72, $p < .01$), irrespective of students' temperament. Moreover, controlling for the effects of gender, students whose temperaments were characterized as intermediate (OR = 3.98, $p < .01$) and high maintenance (OR = 4.57, $p < .01$) were more likely than industrious students to receive negative feedback from their teachers.

DISCUSSION

The purpose of this study was to examine the relationships of student temperament and gender to disruptive classrooms behavior in urban primary grade schools. The findings clearly demonstrate the strong associations between student temperament and classroom disruptive behavior. Students whose temperaments were high maintenance—that is, low in task persistence and high in negative reactivity and activity—were more disruptive than students whose temperaments were characterized as intermediate or industrious. Teachers in this study also reported more difficulty managing the behavior of students with high maintenance temperaments. These findings are consistent with previous cross-sectional and longitudinal studies that have shown that children with challenging temperaments, like those described as high maintenance in this report, exhibit more disruptive behavior and are more difficult to manage, both at school and at home, compared to children with milder temperaments, such as those who are industrious (Caspi, Henry, McGee, & Silva, 1995; Keogh, 2003; McClowry et al., 1994; Smart et al., 2003).

The high maintenance and industrious profiles identified in this study are consistent with those McClowry (2002) derived from parent reports. Whereas the 883 children in that study were from ethnically and socioeconomically diverse families, this study included only African American and Hispanic students from predominantly low-income families. In both studies, boys were disproportionately represented on the high maintenance profile, whereas girls were disproportionately industrious. Still, 29% of the students in this study with industrious temperaments were boys and 31% of children with high maintenance temperaments were girls.

The results, however, explicate the critical need to untangle temperament from gender when studying child disruptive behavior. When the effects of gender were examined alone, boys were, as expected, more disruptive than girls. However, when temperament was also taken into account, the effect of gender on student disruptive behavior attenuated to non-significance. In other words, temperament was a stronger predictor of student disruptive behavior than child gender.

Temperament also influenced observed teacher-student interactions. Students whose temperaments were high maintenance or intermediate, compared to industrious students, received more negative feedback from their teachers regardless of their gender. This finding is supported by a meta-analysis of gender differences in teacher/student interactions conducted by Kelly (1988), who concluded that the generality that boys receive more negative feedback from their teachers did not hold among girls who are disruptive. In this study, students with high maintenance temperaments received five times more negative feedback than their industrious classmates. Students with temperaments characterized as intermediate received 4 times more negative feedback than industrious children.

A different pattern of interactions was associated with positive teacher feedback. Notably, only 20% of the students received any positive feedback. Temperament was not associated with positive teacher feedback—just gender. Boys were more likely to receive positive teacher feedback than were girls. These findings are corroborated by other observational studies that found that girls receive little attention from their teachers (Kelly, 1988; Rudasill & Rimm-Kaufman, 2009).

The finding that temperament was not related to positive teacher feedback was counterintuitive. One might have expected that students with industrious temperaments, who were high in task persistence and low in negativity and activity, would have experienced higher levels of positive feedback because these are the attributes that teachers value (Keogh, 2003). However, they did not.

The overall proportion of observed negative to positive feedback is striking. Teachers gave nearly 3 times more negative than positive feedback to their students. Previous studies also have shown that students receive much more negative than positive feedback (Beaman & Wheldall, 2000; Jones & Dindia, 2004; Kelly, 1998; Sutherland, 2000). The amount of negative feedback in this study warrants concern, because it was directed at economically disadvantaged minority children. Such students are vulnerable to the quality of their relationships with their teachers and particularly benefit responsive student-teacher interactions (Meehan, Hughes, & Cavell, 2003; O'Connor, 2010).

The lack of findings regarding the withdrawal temperament dimension requires further consideration. In this study, withdrawal did not contribute to the cluster analysis and was not associated with any of the other variables, with the exception of a small negative correlation with overt aggression toward others. Withdrawal may not have been related to the findings in this study for several reasons. Teachers are more observant of disruptive student behavior than internally oriented states, such as withdrawal (Gresham, Elliott, Cook, Vance, & Kettler, 2010; Kolko & Kazdin, 1993). As a result, students who are high in withdrawal receive less attention from their teachers than their classmates who are not shy (Rudasill & Rimm-Kaufman, 2009). Another inference may be that the withdrawal dimension represents a distinctly different temperament profile from the other three dimensions of negative reactivity, task persistence, or motor activity. Instead, it may operate separately. This conclusion is supported by the extensive longitudinal research conducted by Kagan and his colleagues who focused exclusively on inhibited versus uninhibited children (Kagan, Snidman, & Arcus, 1992). Further research is needed to more closely examine

how the temperament dimension of withdrawal is related to student classroom behavior and to teacher/student interactions.

STRENGTHS AND LIMITATIONS

The results of these analyses should be considered in relation to the strengths and limitations of the study. One noteworthy strength was the inclusion of teachers' reports of their perceptions of their students' temperaments and observational data. The two sources of data were consistent in demonstrating that students with high maintenance temperaments demonstrated higher levels of disruptive behavior than their intermediate and industrious peers, were perceived by their teachers as more difficult to manage, and received significantly more negative feedback.

Another strength of this study was its setting in urban primary grade classrooms primarily composed of African American students and teachers. A resulting limitation, however, is the relatively homogenous nature of the student population. Qualitative research is recommended to further explore the cultural implications of teacher/student interactions. Comparisons with suburban and rural classrooms also are needed to assess whether these results generalize to other educational contexts and with students and teachers from various socioeconomic and racial/ethnic groups.

An additional limitation is related to the amount of demographic information obtained about the teachers. Level of educational preparation and years of teaching might have been related to the type of feedback provided by teachers. Some of the variation in the types and amounts of teacher feedback also may have been influenced by when the observations were gathered, given observations were conducted over the course of the academic year (e.g., fall vs. spring). In fact, Chow and Kasari (1999) found that the quality of teacher-student interactions changes notably throughout the school year. The small sample size in this study is another limitation that prohibited formally testing the mediation effect. The magnitude of the effects seen in the logistic models indicated that there was not enough power to detect a statistically significant effect using Sobel's z (Fritz & MacKinnon, 2007). A small to moderate effect size would have required sample size of greater than 421 to detect an effect of statistical significance (power = .80). Based on Baron and Kenney's model (1986), however, the results suggest mediation.

IMPLICATIONS FOR CLASSROOM MANAGEMENT

The findings of this study have important implications for classroom management. Teachers are often unaware of how often they provide negative versus positive feedback (Good & Brophy, 2008; Jones & Dindia, 2004; Sutherland, 2000). Although a 3:1 to 4:1 ratio of positive to negative feedback is recommended (Stichter, Stormont, Lewis, & Schultz, 2009), the opposite pattern was found in this study. The practice implications reverberating from this finding cannot be overstated, because negative teacher feedback has deleterious effects on students. Conflictual relationships between primary grade students and their teachers lay the foundation for compromised academic and behavioral outcomes (Birch & Ladd, 1997; Pianta, Steinberg, & Rollins, 1995).

The importance of positive teacher-student relationships is particularly critical for high-risk students (O'Connor, 2010). Montague and Rinaldi (2001) demonstrated that the window of

opportunity to reach high-risk children is narrow. Although children in 1st and 2nd grade were not explicitly aware of their teachers' negative feedback, they were by 3rd grade and, in turn, viewed themselves more negatively (Montague & Rinaldi, 2001).

Frequent negative teacher feedback is counterproductive, because it heightens rather than reduces disruptive behavior (Nelson & Roberts, 2000). Teacher preparation and professional development programs, however, can assist teachers to use evidence-based strategies to better manage student classroom behavior. A limited but expanding number of such programs exist. For example, INSIGHTS Into Children's Temperament, which applied the temperament framework derived from this study, effectively supports teacher efficacy and reduces student disruptive classroom behavior (McClowry et al., 2010). Positive Action is a character development program that enhances student academics and behavior by reinforcing positive actions (Beets et al., 2009). The Classroom Organization and Management Program is a teacher professional development program that assists teachers in creating a classroom environment that fosters student engagement (Evertson & Smithey, 2000). Regardless of the theoretical framework used by such programs, the aim is to enhance teacher/student relationships and classroom management—a goal that is empirically supported by the findings from this study.

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APPENDIX
PRIMARY CLASSROOM OBSERVATION SCALE (PCOS): OPERATIONAL
DEFINITIONS AND EXAMPLES

<i>Observed Variables</i>	<i>Operational Definitions</i>	<i>Example</i>
Student disruptive behavior	<p>Disruptive behavior is the sum of the following codes:</p> <p>Verbal—yelling out an answer out of turn or asks to do something that is unrelated to the ongoing classroom work.</p> <p>Roam—not sitting in the assigned seat.</p> <p>Annoy—a child intentionally annoys a classmate.</p> <p>Oppositional/noncompliance—refusing to comply with a teacher’s request.</p> <p>Child aggression—more extreme forms of child antisocial behaviors.</p>	<p>“Can I go to the bathroom?”</p> <p>Leaving his or her seat or sitting in his or her chair in an inappropriate manner.</p> <p>Calling names or throwing a paper.</p> <p>Silence or verbal refusal: “I don’t have to do that if I don’t want to. You can’t make me.”</p> <p>Pushing, pulling, or hitting.</p>
Teacher feedback:		
Positive	A statement that communicates something positive about the child or his/her performance, rather than merely about the answer to the question. This feedback is made in relation to a child’s intentions, approach to task, effort, motivation, or behavior.	“Very good, Sasha, you really are working hard.”
Negative	A statement directed to a child that is characterized by negative evaluation of the child’s ability, work habits, motives, etc. These are comments that go beyond merely stating an answer is incorrect (even if the child is named) to statements in which larger inferences are made.	“I can tell, Roland, that you are not listening. If you had been paying attention you wouldn’t have gotten that wrong.”