

WHEN IS MOOD REACTIVITY IN CHILDREN A GOOD THING?
ADAPTIVE EFFECTS OF MOOD REACTIVITY TO DISRUPTIVE
BEHAVIOR

by

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This manuscript is dedicated to:

My husband, family, and friends for their ongoing support and encouragement.

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ABSTRACT

The goal of this study was to examine between student differences in mood reactivity to three types of negative events during the school day: disruptive behavior, peer victimization, and academic stress in a sample of 233 fourth and fifth grade children. We hypothesized that mood reactivity to disruptive behavior would have adaptive consequences in reducing future disruptive behavior. Conversely, mood reactivity to disruptive behavior, victimization, and academic stress was expected to increase vulnerability for future depressive symptoms. The results show differential patterns of moderation and outcome for the three types of reactivity. Students with high levels of anxiety/sadness were more reactive to daily fluctuations in disruptive behavior, whereas more disruptive students were less reactive to disruptive behavior. Students' emotional reactivity to their disruptive behavior was also associated with less future disruptive behavior. The results suggest that mood reactivity to disruptive behavior may have a positive impact on child adjustment.

Chapter 1

INTRODUCTION

School is often a context for negative experiences (Roeser, Eccles, & Sameroff, 2000), and these experiences affect fluctuations in children's mood (e.g., Nezlek & Gable, 2001; Nezlek & Plesko, 2003). In addition, research shows a relationship between emotional reactivity to negative events and psychopathology, such as depression (e.g., Cohen, Butler, Gunthert, & Beck, 2005; Schneiders et al., 2006). This research suggests that reactivity to negative events is a maladaptive response that indicates a failure to down regulate negative emotions (Silk, Steinberg, & Morris, 2003). However, past studies have generally been limited to examining reactivity to global stress or negative events. For the most part, these global measures of stress have not differentiated among types of negative events, and, thus, past research has failed to examine whether mood reactivity has unique effects on adjustment depending on the type of event eliciting the mood response. For example, negative mood following behaviors that violate social norms (e.g., disruptive classroom behavior or aggression toward others) may indicate an adaptive response to this type of event. Alternatively, mood reactivity to less controllable stressors may indicate a high degree of sensitivity or vulnerability to daily stressors. The present study addresses this limitation by investigating individual differences in mood reactivity to different types of negative events.

This study examines between-student differences in within-student mood reactivity to disruptive behavior, peer victimization, and academic stress.

The study design is unique in that it compares daily fluctuations in mood and different types of negative events to trait levels of these factors and future symptomatology. We examined the following questions: Does anxiety/sadness reactivity differentially relate to trait levels of anxiety/sadness and average levels of negative school experiences depending on the type of event eliciting the emotional reaction? In addition, do different types of reactivity have differential effects on future internalizing and externalizing behavior? We used structural equation modeling to examine these questions by modeling relations between three latent reactivity slopes and between-student measures of trait anxiety/sadness, average levels of the negative events, and future internalizing and externalizing symptoms.

Mood Reactivity to Negative Events

Building on an extensive literature that shows a relationship between negative life events and negative affect (Brooks-Gunn & Warren, 1989), a growing body of research has begun to examine relations between daily stress and negative affect. Some of these studies suggest that daily stress mediates the relationship between life events and negative affect (Compas, Howell, Phares, Williams, & Ledoux, 1989; Wagner, Compas, & Howell, 1988). Researchers interested in the link between daily events and daily mood refer to this relationship as mood reactivity. The term reactivity refers to a relationship between two variables in which changes in one variable (e.g., mood) occur in response to changes in another variable (e.g., negative events) (Bolger & Zuckerman, 1995).

The majority of studies of within-subject mood reactivity have examined the link between global indices of negative events and negative mood (e.g., van Eck et al., 1998; Grzywacz, Almeida, Neupert, & Ettner, 2004; Marco &

Suls, 1993; Schneiders et al., 2006; Serido, Almeida, & Wethington, 2004). Mood is typically measured by aggregating reports of different negative mood states (e.g., anxiety, sadness, and irritability) (e.g., Bolger & Zuckerman, 1995; Marco & Suls, 1993; Moberly & Watkins, 2008; Serido et al., 2004). Studies often use dichotomous event variables to indicate the presence or absence of an event during a particular time frame, without differentiating between types of stressors (e.g., Moberly & Watkins, 2008; Schneiders et al., 2006; Serido et al., 2004; van Eck et al., 1998). Furthermore, stressors have not been consistently measured in the literature (Grant, Compas, Thurm, McMahon, & Gipson, 2004). Only a few studies have differentiated among stressors in terms of how they impact affect differently depending on the context and the type of stressor (e.g., Bolger, DeLongis, Kessler, & Schilling, 1989; Bolger & Schilling, 1991; Repetti, 1993).

Efforts to study the effects of different types of stressors have mainly focused on unique effects of interpersonal versus noninterpersonal events. Work by Bolger and colleagues (1989; 1991) showed that interpersonal stressors appear to have a stronger effect on mood than noninterpersonal stressors. In addition, O'Neill, Cohen, Tolpin, and Gunthert (2004) found that affective reactivity was a prospective predictor of depression, but only for reactivity to interpersonal stressors (no effect was found for reactivity to noninterpersonal stressors). However, although studies such as these differentiate between interpersonal and noninterpersonal stressors, few have gone beyond this distinction to examine unique effects of more specific types of stressors within these broad domains. The studies that do examine mood reactivity to a specific type of stressor do not compare this with reactivity to a different type of stressor. For example, Repetti

(1993) specifically examined reactivity to occupational stressors. Although she found that an increase in job stress (i.e., high perceived workload) related to more negative and less positive mood and more health complaints, she did not demonstrate whether this effect is unique to occupational stressors.

The stressful life events and psychopathology literature also distinguishes between dependent and independent stressors (Hammen, 2005; Rudolph et al., 2000). Dependent stressors are those to which the individual has contributed, whereas independent stressors are those that occur outside of the individual's control. Thus, the individual is at least partially responsible for dependent stressors, which may even be initiated by the individual (e.g., proactive aggression). Although Kendler, Karkowski, and Prescott (1999) showed that dependent stressors are more strongly linked with depression than independent stressors, dependent and independent stressors have not been examined within a reactivity framework.

Although some research distinguishes between types of negative events, the majority of mood reactivity literature assumes that people experience a similar mood response to negative events, regardless of the type of event. Less consideration has been given to whether mood responses to negative events differ depending on the type of stressor. For example, performing poorly on a test may affect a child's mood differently than experiencing a negative interaction with a teacher. More importantly, the magnitude of the emotional response may have different consequences for the child's well-being depending on the stressor that elicited the response.

Between-Person Moderators of Reactivity

People vary in their degree of reactivity based on a number of different factors (Almeida, 2005; Bolger & Zuckerman, 1995; Moberly & Watkins, 2008). Almeida (2005) found that gender, education, and chronic stress predicted reactivity to daily stressors. Bolger and Zuckerman (1995) also showed that individual differences in reactivity depended on the subjects' levels of neuroticism, such that subjects high in neuroticism had stronger reactivity to stressful events. In addition, Moberly and Watkins (2008) demonstrated that stronger reactivity to daily stressors related to levels of ruminative thinking. Another moderator of reactivity that has been extensively studied has been depressive symptoms (e.g., Nezlek & Gable, 2001; Nezlek & Plesko, 2003; O'Neill et al., 2004; Cohen et al., 2005).

In addition to an association between stress exposure and internalizing symptoms (Carter, Garber, Ciesla, & Cole, 2006; Clements, Aber, & Seidman, 2008; Grant et al., 2004), research also shows that individuals with internalizing symptoms demonstrate greater reactivity to stress. For example, Nezlek and colleagues (2001; 2003) found that depressed subjects reported stronger reactivity to events than non-depressed subjects. In addition, other research has examined reactivity as a predictor of future symptoms. O'Neill et al. (2004) demonstrated the predictive role of mood reactivity in the development of depressive symptoms, and several of these same authors have also used reactivity to predict treatment outcome (reduction in depressive symptoms) (e.g., Cohen et al., 2005). Taken together, these studies suggest that mood reactivity has maladaptive effects on adjustment.

Whereas most research indicates an association between mood reactivity and increased internalizing symptoms, Peeters, Nicholson, Berkhof, Delespaul, and deVries (2003) found contrary evidence that *low* reactivity is problematic. They demonstrated that adults with Major Depressive Disorder showed weaker negative affect reactivity to negative events than non-depressed controls. This inconsistency within the research could be due to the different ways that reactivity was measured. The measure of negative affect used by Peeters and colleagues (2003) was an aggregate of several different types of mood states that included irritability, anxiety, restlessness, tension, guilt, distractibility, and agitation, whereas negative affect in other studies is often made up of just anxious and sad mood. Thus, it is possible that the measures of negative affect in these different studies capture different constructs. In addition, Peeters and colleagues (2003) also used open-ended questions when assessing for positive and negative events, allowing subjects to report on the events they experienced in a subjective manner. Events were likely to vary among subjects, especially given that half the sample met diagnostic criteria for Major Depressive Disorder and the other half did not. Thus, it is difficult to compare the reactivity of these two groups if the subjects consistently reported on different types of events.

The majority of reactivity research has examined global summaries of negative events without considering differential effects of different types of stressors. Perhaps the way that reactivity has been measured, particularly the types of stressors subjects report on, has affected the findings regarding a link between reactivity and psychosocial outcomes. No study has examined mood reactivity to disruptive behavior or considered whether this type of reactivity represents an

adaptive response to this type of behavior. When a child engages in disruptive behavior, we *want* to see that child experience negative mood following this behavior since it may reflect feelings of guilt or remorse. Moreover, this type of reactivity may have positive consequences, such as a decrease in future negative behavior, because the experience of self conscious emotions, such as guilt, is aversive, leading to avoidance of these experiences in the future.

Although the link between mood reactivity and internalizing symptoms has been fairly well established, less is known about the relationship between reactivity and externalizing symptoms. Silk et al. (2003) showed that mood intensity, lability, and emotion regulation techniques are related to both internalizing and externalizing behavior. In this study, mood intensity reflected the mean level of anger, sadness, and anxiety reported by subjects while they thought about the worst event that occurred during the last hour, and lability reflected the mean standard deviation of these mood reports. Although this study does not directly assess links between externalizing behavior and mood reactivity, this and other research suggests that a relationship between these factors exists. Research showing a relationship between guilt and antisocial behavior suggests that self-conscious emotions, such as guilt, may play a role in the persistence of this behavior. For example, De Castro, Merk, Koops, Veerman, and Bosch (2005) found that aggressive boys (compared with non-aggressive boys) attributed less guilt and more happiness to story characters after they provoked a peer. Additionally, in a sample of adult inmates, Hosser, Windzio, and Greve (2008) found that feelings of guilt at the beginning of a prison term correlated with lower rates of recidivism.

Along these same lines, some research suggests that children who exhibit high rates of proactive aggression (i.e., aggression done for instrumental gain) do not experience increases in negative affect following their aggressive acts. In fact, studies suggest that proactive aggression is related to positive affect, such that children's mood improves following aggressive behavior (Dodge, Lochman, Harnish, Bates, & Pettit, 1997). In addition, Callous Unemotional (CU) youth, a subset of severely and persistently aggressive children, are less distressed by the negative effects of their behavior on others compared to non-CU youth (Frick & White, 2008). Moreover, children with CU traits are less reactive to negative stimuli and are less distressed following punishment compared to other children with conduct problems who do not show CU traits (cited in Frick & Morris, 2004). This lack of distress following antisocial behavior is a potential mechanism accounting for the persistence of antisocial behavior among this subset of children.

This literature tentatively suggests that externalizing children may be less reactive to their negative behavior, but no studies have directly tested this hypothesis. The majority of studies demonstrating maladaptive effects of reactivity fail to consider differential relations to other types of psychosocial outcomes, such as externalizing behavior. The current study compares reactivity to disruptive behavior and reactivity to other types of negative events in order to determine whether different types of reactivity have unique effects on internalizing and externalizing behavior.

The Current Study

The majority of research examining relations between reactivity and psychopathology demonstrates mood reactivity as a factor that increases

vulnerability to internalizing symptoms. Yet, few of these studies differentiate between reactivity to different types of negative events or consider whether the effects of mood reactivity differ depending on the type of negative event. The current study uses a measure of school experiences that has differentiated between three types of negative events in school: disruptive behavior, peer victimization, and academic stress. We had several reasons to expect that mood reactivity to disruptive behavior would have different consequences than reactivity to either peer victimization or academic stress. For example, distress following behavior that harms another person, may represent an adaptive response, and may prevent children from continuing to engage in future aggressive behaviors. Past studies have not considered whether types of reactivity show different patterns of association with internalizing behavior or externalizing behavior. Whereas too little distress following aggressive acts may lead to continuation of aggressive behavior, the opposite may also have deleterious effects on adjustment in that frequent experiences of distress may lead to internalizing symptoms.

Our first objective was to examine reactivity to three types of negative events and to determine whether reactivity slopes covaried or were relatively independent. Our second objective was to examine between-student differences in negative mood, disruptive behavior, victimization, and academic stress that may moderate different reactivity slopes. Based on previous findings, we anticipated that students with high trait levels of anxiety/sadness would be more reactive to all three types of negative events. We also expected that more disruptive children would be less distressed in reaction to their own disruptive behavior than less disruptive children. Our third objective was to test reactivity slopes as predictors of

depression and disruptive behavior. We anticipated that reactivity to all three types of negative events would predict future depression but that mood reactivity to disruptive behavior would predict lower levels of future disruptive behavior.

Chapter 2

METHOD

Participants

The sample consisted of 233 fourth and fifth grade students from a public urban elementary school in an urban/suburban school district. The sample was evenly distributed by gender (48% female), predominately minority: 56.8% Black, 26.8% Hispanic, 14.8% White, and 1.6% Asian/Pacific Islander, and economically disadvantaged: 76% qualified for free- or reduced-lunch. 18% of the students qualified for special education.

Procedure

The study procedures and protocol approved by the University's Institutional Review Board included a waiver of parental consent. As required by the waiver, no identifying information about students was provided to or collected by the researchers. Study data (student surveys and demographic data from the school district) were linked solely by student identification numbers. Parents of fourth and fifth grade students at the elementary school were notified of the study two weeks prior to the first administration by a letter from the school principal. The letter instructed parents to contact their child's teacher or building principal if they were unwilling to allow their child to participate.

Data were collected at five different time points throughout the Spring semester of the 2007-2008 school year during the weeks of February 6th-12th,

March 3rd-7th, March 31st-April 4th, April 28th-May 2nd, and May 19th-23rd. Two computerized survey formats were administered. A daily diary format, used at the first four survey administrations, was developed to assess the students' experiences during the school day. A second format, administered approximately one month after the last daily assessment, asked students to report on the occurrence of events over the past week of school rather than on just the previous day in order to capture more stable components of student school experiences. This last administration included measures of child depression and will be referred to as Time 2. Surveys were administered in the computer classroom and students' homeroom teachers were not present during the survey administrations. A trained computer classroom instructor supervised the administration of the surveys.

Students were provided with oral as well as on-screen written instructions about the voluntary and confidential nature of the survey. They were asked to raise their hands at any time during the survey if they did not understand a word or question or were unwilling to complete the survey. After receiving instructions, students were directed to the next page of the web-survey where they were prompted to double-enter their district identification number. Students were provided with a slip of paper with their identification number by their teacher prior to the data collection¹. The daily survey consisted of 41 items and the final survey, which included items measuring additional factors such as sleep and self esteem, consisted of a total of 75 items.

Within-Student Measures of Daily Experiences

The Student Experience Survey (SES) asked students to report on the frequency of interpersonal and achievement events over the course of a day at school. Students were asked to: “Think about the past day at school. How often did each of these things happen to you?” Three response choices were provided for each event: (1 = “0 times,” 2 = “1 time,” 3 = “2 or more times”). The daily events format was designed to reduce memory error and retrospective biases by asking students to report on the occurrence of discrete events over the previous 24 hours (Esposito, Kobak, & Little, 2005).

We tested the validity of the SES items in several steps using both the current sample and a separate sample of 1,000 plus students. The initial step tested the degree to which events co-occurred in ways that indicated clusters of daily events. Component analyses identified four event clusters. Of the original 23 item scale, five items were eliminated due to cross-loading of the items on more than one component. On the basis of these analyses, four factors were identified: Disruptive Behavior (7 items), Peer Victimization (4 items), Academic Stress (4 items), and Positive Interactions with Teachers (3 items). Only the disruptive behavior, victimization, and academic stress subscales were used for this study.

Disruptive Behavior. The disruptive behavior subscale consisted of three items measuring the frequency (during the school day) with which students experienced negative disciplinary interactions with teachers (Esposito et al., 2005; Little & Kobak, 2003) and four items measuring frequency of aggression towards peers (BASC; Reynolds & Kamphaus, 2002). Examples of the disruptive behavior

items include: “Was sent out of class by a teacher” and “Teased another student.” All items were rated on a 1 to 3 scale with higher values indicating more frequent disruptive behavior and the items were averaged to form a composite for each daily assessment. The mean across all the days was 1.31 ($SD = .35$). The scale had good internal consistency, with reliability coefficients ranging from .77 to .86 across the time points.

Peer Victimization. Students reported on four items measuring the frequency of negative peer events associated with victimization experiences (Kochenderfer & Ladd, 1996). Peer victimization items included: “Another student picked on me,” “Another student said mean things to me,” “Another student said bad things about me to other students,” and “Another student hit or pushed me.” All items were rated on a 1 to 3 scale with higher values indicating more frequent peer victimization experiences and the items were averaged to form a composite for each daily assessment. The mean across all the days was 1.41 ($SD = .46$). The measure had good internal consistency, $r = .83$.

Academic Stressors. Students reported the frequency with which they experienced academic stressors with four items derived from the Education Stress subscale of The Adolescent Minor Stress Inventory (AMSI; Ames et al., 2005). Students reported the frequency with which they experienced these academic stressors (during the past school day) on a 1 to 3 scale with higher values indicating more frequent stressors. Items included: “Had trouble understanding a reading assignment,” “Had trouble doing my homework,” “Had trouble understanding a math lesson,” and “Had trouble answering when the teacher called

on me.” The items were averaged to form a composite for each daily assessment. The mean across all the days was 1.56 ($SD = .46$). The internal consistency of the measure was $r = .68$.

Anxiety/Sadness. In addition to the SES items, students rated their daily mood on how they were feeling *right now*. Four items describing anxiety (e.g., Feel scared) and four items describing sadness (e.g., Feel sad) were derived from the Positive and Negative Affect Schedule – Expanded Form (PANAS-X; Watson & Clark, 1994). Students reported the strength of their experience of anxious and sad feelings on a 1 to 4 scale with higher values indicating stronger experiences: (1 = “not at all,” 2 = “a little,” 3 = “somewhat,” 4 = “a lot”). The items measuring anxiety and sadness loaded together in component analyses, and were combined to represent an anxious/sad mood state. The mean of the anxious/sad items across all four diary days was 1.34 ($SD = .47$). The scale had good internal consistency, with reliability coefficients ranging from .89 to .92 across the time points.

Between-Student Measures

Student Demographic Characteristics. Student grade, gender, disadvantaged status, minority status, free-/reduced-lunch status, and special education data were provided by the school district. Each of these variables was dummy-coded.

Disruptive Behavior. The between-student measure of disruptive behavior used the same seven event items as the within-student measure except

students reported on the *weekly* frequency with which they engaged in disruptive behavior in order to capture more stable components of student behavior. Four response choices were provided for each event: (1 = “0 times,” 2 = “1-2 times,” 3 = “3-5 times,” 4 = “6 or more times”). The items were averaged to form a composite ($M = 1.35$, $SD = .54$). The measure had good internal consistency, $r = .87$.

Depression. Students reported depressive symptoms on the short-form of the Child Depression Inventory (CDI; Kovacs, 1992), which consists of 10 items. Students were asked to pick one sentence from a group of three sentences that best described themselves in the past two weeks. Items were rated on a scale from 1 to 3 with higher scores indicating more depressive symptoms. The average depression scores across the four daily assessments was 1.14 ($SD = .41$) and the internal consistency of the measure was .70.

NOTES

¹ In some classes, identification numbers were read aloud to individual students by the computer instructor.

Chapter 3

RESULTS

The results are organized by the study objectives. Preliminary analyses examined the zero-order correlations for predictor, outcome, and demographic variables. Next, within-subject models examined the relationships between daily levels of anxiety/sadness and negative events (i.e., disruptive behavior, victimization, and academic stress). We then used structural equation modeling to examine the moderating effects of between-subject levels of trait anxiety/sadness on the within-subject reactivity slopes while controlling for average levels of the negative events and demographic variables. Finally, predictive relationships between the reactivity slopes and the Time 2 variables of depression and disruptive behavior were examined with demographic controls.

Statistical analyses were conducted with the statistical software package Mplus Version 5.21 (Muthén & Muthén, 1998-2007), which allowed estimation of latent reactivity slopes. Multilevel modeling was used to account for the clustering of repeated measures observations within students. Within-student reactivity relationships were examined at Level 1 and between-student variability in the reactivity relationships was examined at Level 2.

Preliminary Analyses

The first set of analyses examined the zero-order correlations among the variables of anxiety/sadness, disruptive behavior, victimization, and academic stress aggregated across the four daily assessments, as well as Time 2 depression scores and disruptive behavior. Table 1 presents descriptive statistics.

Table 1. Descriptive Statistics for Student Level Variables

| Variable | M | <i>SD</i> | Range | Minimum | Maximum |
|-------------------------------|------|-------------|-------|---------|---------|
| 1. Peer Victimization | 1.41 | <i>0.46</i> | 1.83 | 1.00 | 2.83 |
| 2. Academic Stress | 1.56 | <i>0.46</i> | 1.92 | 1.00 | 2.92 |
| 3. Disruptive Behavior | 1.31 | <i>0.35</i> | 1.93 | 1.00 | 2.93 |
| 4. Anxiety/Sadness | 1.34 | <i>0.47</i> | 2.63 | 1.00 | 3.63 |
| 5. Time 2 Disruptive Behavior | 1.35 | <i>0.54</i> | 3.00 | 1.00 | 4.00 |
| 6. Time 2 Depression | 1.14 | <i>0.41</i> | 2 | 1 | 3 |
| 7. Grade | 0.73 | <i>0.45</i> | 1 | 0 | 1 |
| 8. Gender | 0.48 | <i>0.50</i> | 1 | 0 | 1 |
| 9. Minority Status | 0.84 | <i>0.37</i> | 1 | 0 | 1 |
| 10. Lunch Status | 0.76 | <i>0.43</i> | 1 | 0 | 1 |
| 11. Special Education Status | 0.18 | <i>0.38</i> | 1 | 0 | 1 |

Note. Gender: 0 = male, 1 = female; Minority: 0 = Non-minority, 1 = Minority; Lunch: 0 = does not qualify for free or reduced lunch, 1 = qualifies for free or reduced lunch status; Special Education: 0 = Regular Education, 1 = Special Education.

Table 2 presents correlations. As shown in Table 2, the aggregate events variables covaried, indicating that children who reported one type of negative event were more likely to report another type of negative event as well as higher levels of anxiety/sadness, Time 2 depression, and Time 2 disruptive behavior. Correlations with demographic variables indicated that fifth graders reported less daily victimization and academic stress than fourth graders, girls reported lower daily rates of disruptive behavior than boys, minority students reported higher rates of academic stress, and children who qualified for free-/reduced- lunch status reported more depression. These five demographic variables were used as control variables in subsequent analyses.

Table 2. Zero-Order Correlations Among Student Level Predictor, Outcome, and Demographic Variables (N = 233)

| Variable | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
|-------------------------------|---------|---------|--------|--------|--------|--------|---------|-------|--------|--------|
| 1. Victimization | --- | | | | | | | | | |
| 2. Academic Stress | 0.27** | --- | | | | | | | | |
| 3. Disruptive Behavior | 0.45** | 0.38** | --- | | | | | | | |
| 4. Anxiety/Sadness | 0.57** | 0.29** | 0.25** | --- | | | | | | |
| 5. Time 2 Disruptive Behavior | 0.35** | 0.25** | 0.64** | 0.19* | --- | | | | | |
| 6. Time 2 Depression | 0.41** | 0.17* | 0.14* | 0.53** | 0.25** | --- | | | | |
| 7. Grade | -0.22** | -0.24** | -0.04 | -0.10 | -0.02 | -0.12 | --- | | | |
| 8. Gender | 0.11 | -0.01 | -0.15* | 0.02 | -0.08 | 0.02 | -0.07 | --- | | |
| 9. Minority | -0.02 | 0.14** | 0.05 | -0.01 | 0.06 | 0.01 | -0.22** | 0.12 | --- | |
| 10. Lunch | -0.04 | 0.04 | 0.09 | 0.04 | 0.04 | 0.14** | -0.14* | 0.11 | 0.27** | |
| 11. Special Education | 0.09 | 0.15* | 0.14* | 0.19* | 0.12 | 0.30** | -0.22** | -0.08 | 0.05 | 0.18** |

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

Note. Gender: 0 = male, 1 = female; Minority: 0 = Non-minority, 1 = Minority; Lunch: 0 = does not qualify for free or reduced lunch, 1 = qualifies for free or reduced lunch status; Special Education: 0 = Regular Education, 1 = Special Education.

Level 1 Analyses

Within-Student Reactivity

The first objective of the study was to examine mood reactivity to disruptive behavior, victimization, and academic stress and to assess the degree to which each of these reactivity slopes covaried or were relatively independent. Reactivity was measured at Level 1 in terms of the degree to which daily reports of anxiety/sadness varied as a function of daily reports of negative events. The model estimated the mean slopes of the three reactivity relationships by regressing anxiety/sadness on each type of daily negative event. The events variables were group mean centered in all analyses so that the within-subject mean for each student was equal to zero. The slopes varied randomly in order to account for dependencies among the repeated measures observations and to examine the variability between students. The intraclass correlation (ICC) was 0.58, which indicates that 58% of the variance in anxiety/sadness is between students. Path diagrams representing the three types of anxiety/sadness reactivity are depicted in Figure 1.

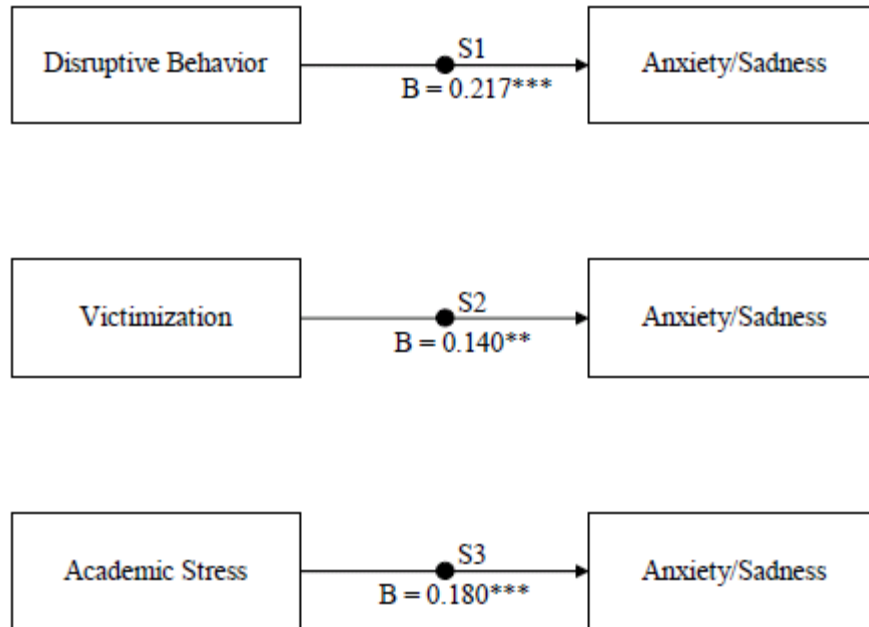


Figure 1. Within-subject reactivity slopes

Table 3 presents the results of the Level 1 regression analyses. The estimated mean anxiety/sadness score across all students was 1.37 ($p < .001$) and the estimated mean reactivity relationships for reactivity to disruptive behavior, victimization, and academic stress across all students was 0.217 ($p < .001$), 0.140 ($p < .01$), and 0.180 ($p < .001$), respectively. Thus, students showed reactive increases in anxiety/sadness on days when they experienced higher levels of each type of event.

Table 3. Within-Subject Anxiety/Sadness Reactivity Slopes (N = 233)

| Predictor Variable | Coefficient | SE | z-value | p-value |
|---------------------|-------------|-------|----------|---------|
| Disruptive Behavior | 0.217 | 0.054 | 4.042*** | 0.000 |
| Peer Victimization | 0.140 | 0.046 | 3.071** | 0.002 |
| Academic Stress | 0.180 | 0.037 | 4.927*** | 0.000 |

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

Next, in order to examine between-student variability in these slopes and to assess the degree to which the reactivity slopes covaried, three latent slopes were created. Results showed significant variability in the random slopes of reactivity to disruptive behavior ($\chi^2 = 0.227$, $S.E. = 0.082$, $p < .01$) and reactivity to victimization ($\chi^2 = 0.086$, $S.E. = 0.038$, $p < .05$). However, variability in the reactivity to academic stress slope was not significant ($\chi^2 = 0.003$, $S.E. = 0.188$, $p > .05$). Correlations between reactivity to disruptive behavior and reactivity to victimization ($r = -0.104$, $p > .05$), reactivity to disruptive behavior and reactivity to academic stress ($r = 0.034$, $p > .05$), and reactivity to victimization and reactivity to academic stress ($r = -0.055$, $p > .05$) were not significant, indicating the relative independence of these different measures of reactivity.

Level 2 Analyses

Measurement Model of Between-Student Variables

In order to examine between-student moderators of the reactivity slopes, we conducted a confirmatory factor analysis to test the validity of four latent factors representing trait anxiety/sadness, disruptive behavior, victimization, and academic stress. The measurement model (depicted in Figure 2) used the four observed daily assessments as indicators of latent trait variables.

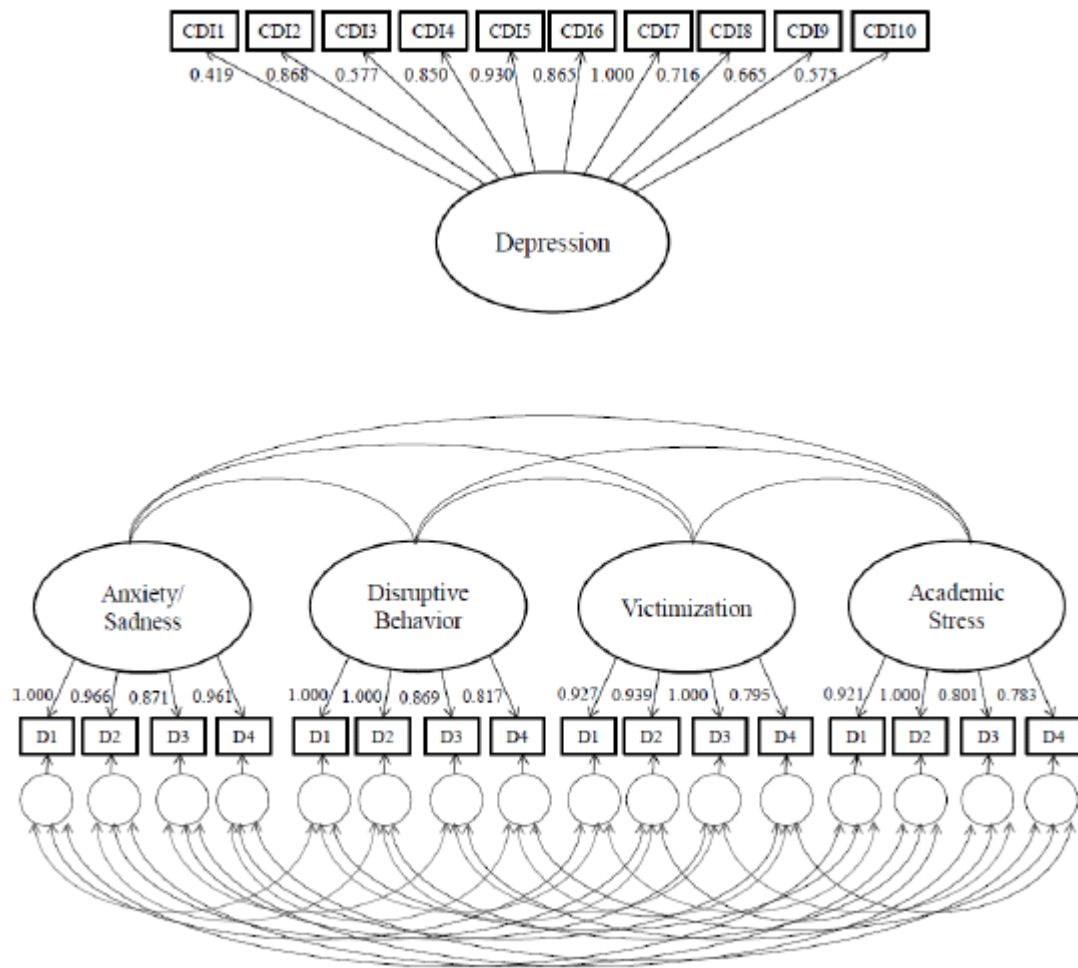


Figure 2. Measurement model

The four daily scores for anxiety/sadness were modeled to load onto a trait anxiety/sadness factor, and the negative events scores for the four daily assessments were modeled to load onto three factors representing trait levels of disruptive behavior, victimization, and academic stress. To account for within-day shared variance resulting from mood biases, we allowed error terms for measures collected on the same day to

covary, as depicted by the curved double-headed arrows between the smaller circles in Figure 2. Because the structural model also includes the predictive relationship between reactivity and Time 2 depression, the 10 CDI items were also included in the model to load on a separate latent depression factor.

In comparing the fit of the hypothesized five-factor model, chi-square tests and goodness-of-fit indices were used. A chi-square test assessed the magnitude of the discrepancy between the observed and model implied covariance matrices. A significant test result indicates a poor fit. However, the chi-square statistic is sensitive to sample size and to violation of the normality assumption, and, thus, a trivial discrepancy that may be of no practical or theoretical interest may lead to the rejection of a model (Chen, 2005). Therefore, we also examined indices of fit. The absolute fit indices Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) assessed the degree to which the model implied covariance matrix matches the observed covariance matrix. For these indices, a value of 0 indicates an optimal fit, whereas increasing values indicate greater departure of the implied covariance matrix from the observed matrix. For both the RMSEA and the SRMR, adequate fit is indicated by values of .08 or below (Hu & Bentler, 1998). The Comparative Fit Index (CFI) is an Incremental Fit Index ranging from 0 (poor fit) - 1.00 (perfect fit). This index assesses the degree to which the tested model is superior to an alternative model in reproducing the observed covariance matrix. For the CFI, larger values indicate greater improvement of the model over a null model in reproducing the observed covariance matrix. Adequate fit for the comparative fit index (CFI) is indicated by a value of .95 or above (Hu & Bentler, 1998).

The chi-square statistic was significant ($\chi^2 = 343.129$, $df = 265$, $p < .001$), suggesting that the model does not provide adequate fit. However, the performance of the chi-square test is affected by large sample size. Thus, the other fit indices were also used to assess model fit. The fit indices indicated that there was adequate model fit (RMSEA = 0.017, SRMR = 0.063, CFI = 0.960).

Moderating Effects of Trait Variables

Our second objective was to examine whether between-student differences in trait levels of anxiety/sadness, disruptive behavior, victimization, and academic stress moderated mood reactivity to daily events. Because we predicted differential effects for reactivity to disruptive behavior, two separate models were estimated in order to more clearly illustrate differences between reactivity to disruptive behavior and reactivity to victimization and academic stress. One structural model compared effects for reactivity to disruptive behavior and reactivity to victimization, and another structural model compared effects for reactivity to disruptive behavior and reactivity to academic stress. A similar pattern of findings was observed when all three types of reactivity were compared in the same model, although only results for the two separate models are included in this paper. The first structural model (depicted in Figure 3) shows the moderating effects of between-student trait variables on within-student reactivity to disruptive behavior and reactivity to victimization, and the second structural model (depicted in Figure 4) shows the moderating effects of trait variables on reactivity to disruptive behavior and reactivity to academic stress. Not depicted in these models is

the measurement model (i.e., the relations between observed variables and latent variables) and demographic control variables.

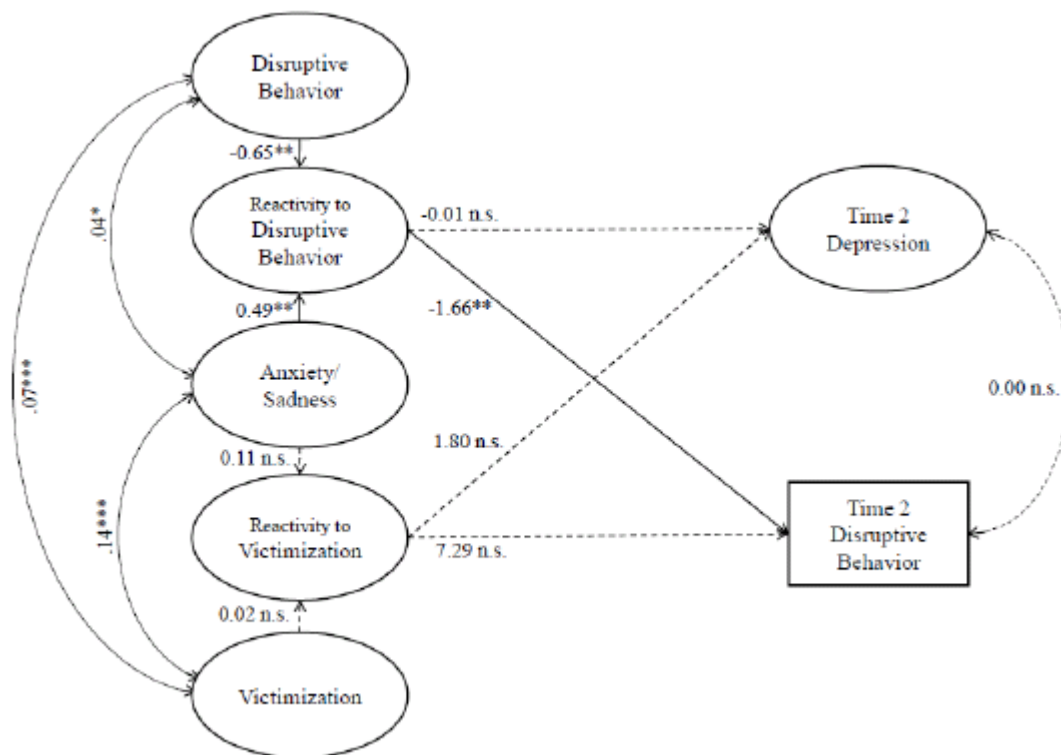


Figure 3. Structural model with reactivity to disruptive behavior and reactivity to victimization

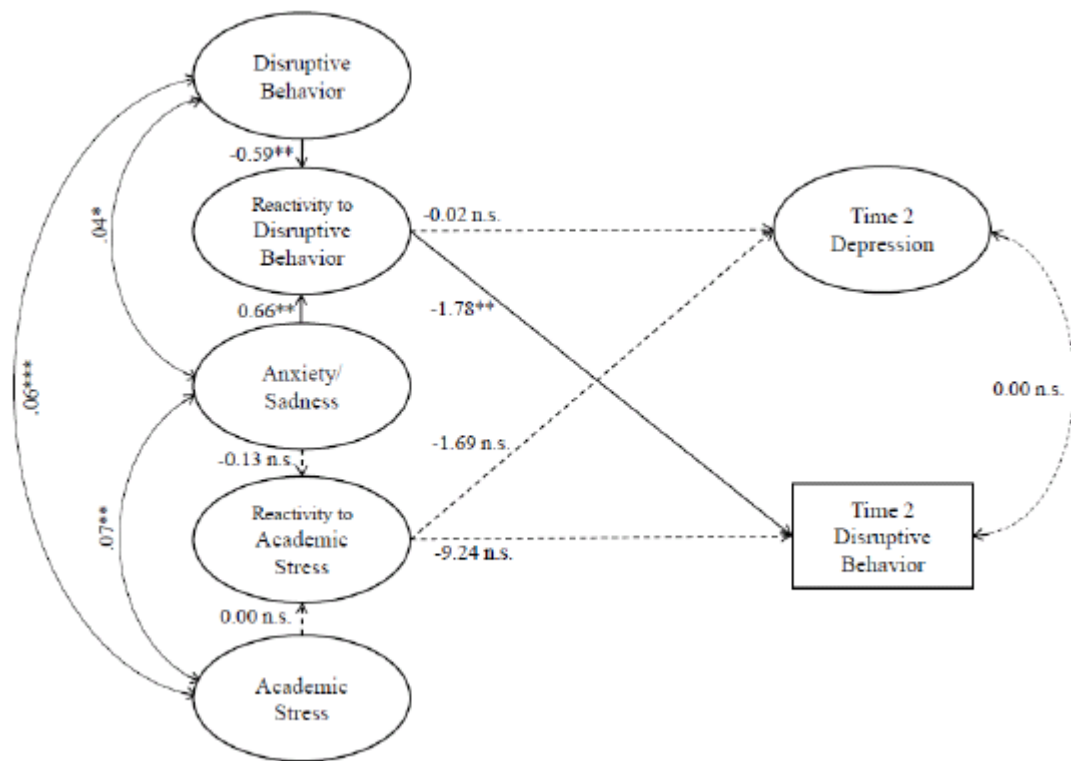


Figure 4. Structural model with reactivity to disruptive behavior and reactivity to academic stress

Table 4 presents the fixed effects for the model that includes reactivity to disruptive behavior and reactivity to victimization. Table 5 presents the fixed effects for the model with reactivity to disruptive behavior and reactivity to academic stress.

Table 4. Between-Subject Effects on Reactivity to Disruptive Behavior and Reactivity to Victimization with Controls for Demographic Variables (N =233)

| Variable | Reactivity to Disruptive Behavior | | | | Reactivity to Victimization | | | |
|----------------------------------|--------------------------------------|------|---------|---------|--------------------------------|------|---------|---------|
| | Coefficient | SE | z-value | p-value | Coefficient | SE | z-value | p-value |
| Latent Trait/Aggregate Variables | | | | | | | | |
| Anxiety/Sadness | 0.49** | 0.18 | 2.70 | 0.007 | 0.11 | 0.12 | 0.93 | 0.354 |
| Disruptive Behavior | -0.65** | 0.24 | -2.69 | 0.007 | --- | --- | --- | --- |
| Victimization | --- | --- | --- | --- | 0.02 | 0.02 | 0.73 | 0.463 |
| Demographic Controls | | | | | | | | |
| Grade | 0.20 | 0.17 | 1.15 | 0.251 | -0.08 | 0.12 | -0.66 | 0.511 |
| Gender | -0.06 | 0.14 | -0.39 | 0.693 | 0.07 | 0.11 | 0.65 | 0.518 |
| Minority | 0.05 | 0.16 | 0.31 | 0.760 | -0.05 | 0.15 | -0.32 | 0.748 |
| Lunch | -0.05 | 0.16 | -0.31 | 0.758 | 0.05 | 0.14 | 0.33 | 0.745 |
| Special Education | 0.56* | 0.23 | 2.46 | 0.014 | -0.27 | 0.20 | -1.34 | 0.181 |

Note. Coefficients are unstandardized.

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

Table 5. Between-Subject Effects on Reactivity to Disruptive Behavior and Reactivity to Academic Stress with Controls for Demographic Variables (N =233)

| Variable | Reactivity to Disruptive Behavior | | | | Reactivity to Academic Stress | | | |
|----------------------------------|--------------------------------------|------|---------|---------|----------------------------------|------|---------|---------|
| | Coefficient | SE | z-value | p-value | Coefficient | SE | z-value | p-value |
| Latent Trait/Aggregate Variables | | | | | | | | |
| Anxiety/Sadness | 0.66** | 0.22 | 2.99 | 0.003 | -0.13 | 0.10 | -1.34 | 0.181 |
| Disruptive Behavior | -0.59** | 0.21 | -2.74 | 0.006 | --- | --- | --- | --- |
| Academic Stress | --- | --- | --- | --- | 0.00 | 0.01 | 0.15 | 0.878 |
| Demographic Controls | | | | | | | | |
| Grade | 0.06 | 0.15 | 0.378 | 0.706 | 0.09 | 0.10 | 0.865 | 0.387 |
| Gender | 0.04 | 0.13 | 0.279 | 0.781 | -0.04 | 0.08 | -0.443 | 0.658 |
| Minority | -0.07 | 0.14 | -0.522 | 0.601 | 0.10 | 0.10 | 1.048 | 0.295 |
| Lunch | 0.00 | 0.16 | 0.019 | 0.985 | 0.03 | 0.12 | 0.234 | 0.815 |
| Special Education | 0.35 | 0.20 | 1.808 | 0.071 | -0.03 | 0.09 | -0.266 | 0.790 |

Note. Coefficients are unstandardized.

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

Examination of the coefficients shows that trait anxiety/sadness and trait disruptive behavior moderated the children's reactivity to disruptive behavior with demographic variables controlled. Students with high trait disruptive behavior were *less* reactive to daily disruptive behavior than were those with lower levels of disruptive behavior, whereas those with high trait anxiety/sadness were *more* reactive to daily levels of disruptive behavior than those with lower levels of disruptive behavior. The relationships between the Level 2 moderating variables and the reactivity to victimization and academic stress slopes were not significant.

Reactivity Slopes as Predictors

Our final objective was to test within-subject reactivity as predictors of Time 2 depression and disruptive behavior. The Time 2 disruptive behavior variable and latent depression factor were regressed on the reactivity slopes, with demographic variables controlled. These relationships are also shown in the two structural models depicted in Figures 3 and 4.

Tables 6 and 7 present the effects for these models. As illustrated, none of the reactivity slopes predicted depression. However, the latent reactivity-to-disruptive behavior slope significantly influenced Time 2 disruptive behavior, resulting in lower Time 2 disruptive behavior scores. The relationships between the other reactivity slopes and Time 2 disruptive behavior were not significant.

Table 6. Between-Subject Effects of Reactivity to Disruptive Behavior and Reactivity to Victimization on Time 2 Depression and Time 2 Disruptive Behavior with Controls for Demographic Variables (N =233)

| Variable | Time 2 Depression | | | | Time 2 Disruptive Behavior | | | |
|-----------------------------------|----------------------|------|---------|---------|-------------------------------|------|---------|---------|
| | Coefficient | SE | z-value | p-value | Coefficient | SE | z-value | p-value |
| Latent Reactivity Slopes | | | | | | | | |
| Reactivity to Disruptive Behavior | -0.01 | 0.08 | -0.11 | 0.909 | -1.66** | 0.61 | -2.74 | 0.006 |
| Reactivity to Victimization | 1.80 | 1.74 | 1.04 | 0.301 | 7.29 | 7.21 | 1.01 | 0.312 |
| Demographic Controls | | | | | | | | |
| Grade | 0.16 | 0.27 | 0.60 | 0.552 | 0.94 | 1.32 | 0.71 | 0.479 |
| Gender | -0.13 | 0.20 | -0.64 | 0.524 | -0.58 | 0.86 | -0.68 | 0.498 |
| Minority | 0.08 | 0.30 | 0.26 | 0.792 | 0.50 | 1.40 | 0.36 | 0.720 |
| Lunch | -0.04 | 0.29 | -0.14 | 0.889 | -0.44 | 1.36 | -0.32 | 0.748 |
| Special Education | 0.60 | 0.52 | 1.15 | 0.249 | 2.91 | 2.56 | 1.14 | 0.256 |

Note. Coefficients are unstandardized.

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

Table 7. Between-Subject Effects of Reactivity to Disruptive Behavior and Reactivity to Academic Stress on Time 2 Depression and Time 2 Disruptive Behavior with Controls for Demographic Variables (N =233)

| Variable | Time 2 Depression | | | | Time 2 Disruptive Behavior | | | |
|-----------------------------------|----------------------|------|---------|---------|-------------------------------|------|---------|---------|
| | Coefficient | SE | z-value | p-value | Coefficient | SE | z-value | p-value |
| Latent Reactivity Slopes | | | | | | | | |
| Reactivity to Disruptive Behavior | -0.02 | 0.10 | -0.14 | 0.886 | -1.78** | 0.64 | -2.791 | 0.005 |
| Reactivity to Academic Stress | -1.69 | 1.85 | -0.91 | 0.360 | -9.24 | 6.16 | -1.501 | 0.133 |
| Demographic Controls | | | | | | | | |
| Grade | 0.16 | 0.25 | 0.635 | 0.526 | 0.95 | 1.03 | 0.926 | 0.354 |
| Gender | -0.05 | 0.13 | -0.423 | 0.672 | -0.24 | 0.65 | -0.365 | 0.715 |
| Minority | 0.16 | 0.26 | 0.591 | 0.554 | 0.86 | 1.06 | 0.806 | 0.420 |
| Lunch | 0.09 | 0.20 | 0.442 | 0.658 | 0.25 | 0.97 | 0.256 | 0.798 |
| Special Education | 0.08 | 0.17 | 0.459 | 0.646 | 0.45 | 0.95 | 0.477 | 0.633 |

Note. Coefficients are unstandardized.

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

Chapter 4

DISCUSSION

The findings demonstrate three unique and relatively independent types of mood reactivity to negative school events (reactivity to disruptive behavior, reactivity to victimization, and reactivity to academic stress) with differential patterns of moderation and outcome. More specifically, fourth and fifth grade children who became distressed on days in which they reported engaging in disruptive behavior generally engaged in less disruptive behavior and reported less future disruptive behavior. In addition, trait anxiety/sadness moderated reactivity to disruptive behavior, such that children with high trait levels of anxiety/sadness showed more distress on days in which they reported engaging in disruptive behavior. These moderating and predictive effects were not shown for reactivity to peer victimization or academic stress.

Reactivity to Different Types of Negative Events

Our first objective was to examine mood reactivity to different types of daily school events. Overall, students showed reactive increases in anxiety/sadness on days in which they reported experiencing negative events, regardless of the type of event. However, these reactivity relationships were relatively independent, such that some children showed more reactivity to one type of event than another. These findings suggest that mood reactivity is not a global or unitary construct, but differs within

students depending on the type of negative event experienced. Studies examining reactivity to global stress have generally ignored the possibility that reactivity to different types of stressors represents unique experiences. Identifying different types of reactivity allowed us to explore whether reactivity has differential impact on adjustment depending on the type of event eliciting the mood response.

Adaptive Effects of Reactivity

Our second and third objectives were to examine relations between mood reactivity and both concurrent student behavior and future behavior. We predicted that reactivity to disruptive behavior would have adaptive consequences. For the most part, research showing maladaptive effects of mood reactivity has included only global measures of negative events (e.g., Cohen et al., 2005; Schneiders et al., 2006). Furthermore, past research has not examined relations between reactivity and externalizing problems. This study provides evidence that reactivity to disruptive behavior is related to both concurrent and future disruptive behavior, such that students showing strong anxious/sad reactions to their disruptive behavior were generally less disruptive and reported fewer future disruptive behavior events than students showing weaker emotional reactions to this behavior. These findings suggest that distress following disruptive behavior may have adaptive consequences. Adaptive effects of reactivity were not shown for reactivity to victimization or reactivity to academic stress, suggesting that there is something unique about mood reactivity to disruptive behavior.

The types of negative events examined in this study differ on two dimensions: interpersonal/noninterpersonal and dependent/independent. Disruptive behavior is a type of negative experience that is both dependent and interpersonal. We first compared reactivity to this type of event to reactivity to an independent interpersonal event (i.e., peer victimization) and then compared it to reactivity to an independent noninterpersonal event (i.e., academic stress). These two separate comparisons showed the same pattern of results in which reactivity to disruptive behavior had adaptive consequences for student behavior (i.e., related to less disruptive behavior), whereas the other two types of reactivity did not. Disruptive behavior differs from victimization and academic stress in the amount of control children have over these experiences. Disruptive behavior, a dependent stressor, is initiated by the child, whereas victimization and academic stress, independent stressors, occur outside of the child's control. These findings indicate that distress elicited from dependent events in which the child has chosen to participate in negative behavior may be adaptive.

Findings suggest that distress following behavior that harms another person prevents children from continuing to engage in this type of behavior in the future. Negative mood following negative behavior may represent the experience of self-conscious emotions, such as guilt or remorse. Research on these types of emotions suggests that they play an adaptive role in the reduction of aggressive and antisocial behavior (e.g., Hosser et al., 2008). Additionally, since our measure of disruptive behavior in the current study included negative disciplinary interactions with teachers, the findings suggest that children who are generally disruptive do not feel the negative

emotional repercussions of punishment. Thus, these children have no reason to inhibit this type of behavior.

Reactivity and Internalizing Symptoms

Based on past research that demonstrates relations between mood reactivity and internalizing symptoms (e.g., Nezlek & Gable, 2001; Nezlek & Plesko, 2003), we predicted that children high in trait anxiety/sadness would show stronger reactivity regardless of the type of event eliciting the mood response. However, this hypothesis was only supported for reactivity to disruptive behavior. Additionally, although we predicted that all three types of reactivity would predict future depressive symptoms, this hypothesis was not supported for any of the reactivity types. There are several possible explanations for these null findings. It is possible that these relationships do not exist for these types of reactivity or that they do not occur in this particular developmental period. Another explanation is that the study lacked sufficient power to demonstrate these effects. The four repeated measures may not have produced enough within-student variability to detect relations between reactivity and the other variables. The variability of the reactivity slopes could also have been affected by the number of items used to measure each type of negative event. Differential effects between trait anxiety/sadness and the different reactivity slopes could be due to the fact that the disruptive behavior measure consisted of seven items while the victimization and academic stress measures each consisted of only four items.

Limitations

Our study had several limitations. First, the sample consisted of predominately disadvantaged students. Although this was useful since it allowed us to examine a sample of students who are most at risk for experiencing internalizing and externalizing problems (Dodge, Pettit, & Bates, 1994; Duncan, Brooks-Gunn, & Klebanov, 1994; Korenman, Miller, & Sjaastad, 1995; McLeod & Shanahan, 1993; Patterson, Kupersmidt, & Vaden, 1990; Stipek & Ryan, 1997), it is unclear as to whether these findings generalize to a more advantaged population. Similarly, second, this is the first mood reactivity study that we know of that has examined effects of reactivity for 4th and 5th grade students. Although this is an advantage of the study, since it expands the reactivity research to include a younger population, our findings may be specific to students in these grades only. Third, the four daily assessments may not have been enough to produce sufficient variability in the reactivity slopes; thus, it is possible that our lack of findings regarding relationships between reactivity and internalizing symptoms are due to weak statistical power. Fourth, information for the study came from student reports only. We cannot determine whether we would have obtained different results had we included other informants, such as teachers and parents.

Summary

The present study provides support for the unique effects of mood reactivity to daily disruptive behavior. This type of reactivity relationship showed adaptive consequences for adjustment. More specifically, fourth and fifth grade

students who experience reactivity to disruptive behavior appear to be less disruptive than those who experience weaker reactivity to this type of behavior. Furthermore, the experience of negative mood in response to disruptive behavior appears to prevent the persistence of this type of behavior. Findings also suggest that students high in trait anxiety/sadness experience stronger mood reactivity to disruptive behavior than those with low trait anxiety/sadness.

Implications and Future Directions

The present study suggests that mood reactivity to disruptive behavior has adaptive consequences in that it plays a role in the reduction of this type of behavior. Interventions that increase the likelihood that students will experience negative emotions, such as anxiety and sadness, following disruptive behavior may decrease disruptive behavior over time. For example, interventions targeted at developing empathy might increase the child's experience of guilt and remorse following negative behavior, such as behavior that harms another person, and the experience of these aversive emotions might cause children to avoid this type of behavior in the future. Additionally, more aversive disciplinary actions for disruptive/aggressive behavior might increase the negative emotional repercussions perceived by the child, which might prevent the child from participating in this type of behavior in the future.

The present study expanded past research by examining effects of reactivity to externalizing behavior and provided evidence that certain types of reactivity have adaptive consequences for the persistence of this type of behavior. Further research should continue to examine the relationship between reactivity and other outcomes.

Perhaps reactivity has additional adaptive effects. Moreover, research should continue to examine unique effects of different types of reactivity. For example, reactivity to specific types of positive events might serve more of a protective factor against the development of internalizing problems than others. Future research should also compare the differences between different types of mood responses to negative events. For example, anger reactivity and anxiety/sadness reactivity might show differential effects. In addition to examining the relationship between reactivity and externalizing behavior, the present study also extends reactivity research into middle childhood. Future research should continue to examine reactivity in this particular developmental period to determine whether there are unique effects for this period. Finally, future research should include more repeated measures in order to strengthen the measure of within-student reactivity and include an outcome assessment that occurs at a later time in order to examine whether effects maintain over time.

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