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Concurrent and Longitudinal Correlation Between Children's Emotional Reactivity, Regulation and Adjustment

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Abstract: This paper describes a study using two different samples to examine concurrent and longitudinal relations between children's emotional reactivity, regulation and adjustment. Forty-eight children from preschool through second grade were recruited to provide data on concurrent relations between regulation, reactivity and adjustment (sample 1). And forty kindergarten children were recruited and assessed at 2 time points to provides longitudinal relations (sample 2). Emotional reactivity and regulation were assessed during home visits using the same series of disappointment tasks, questionnaires and coding system. In sample 1, teachers completed a problem behavior checklist at the same time with the home visit. In sample 2, teachers completed the checklist two years after home observation. Results indicate that the dysregulation of sadness is associated with internalizing behavior concurrently, and that the dysregulation of anger is associated with externalizing problems two years later. Children's anger reactivity is associated with both concurrent and later externalizing problems.

Keywords: Anger, sadness, regulation, reactivity, adjustment.

1. Introduction

In a growing number of studies across disciplines, problems in emotion regulation have been linked to the development of adjustment problems in children [10, 18]. Children who display high levels of negative emotions, such as anger and sadness, are more likely to be aggressive and to suffer from a broad range of psychological problems [12]. Problems in regulating negative emotions have also been linked to a variety of psychological problems, including poor social competence [6], depression [13, 25], anxiety [23], and aggressive behavior problems [9, 14]. While most studies focus on children's regulation of generalized distress, few studies differentially examine negative emotions and their relations to adjustment. In response, the current study examines the regulation of anger and sadness specifically in relation to adjustment problems in early childhood. Moreover, this study examines patterns of regulation and reactivity observationally.

Emotion regulation and emotional reactivity are highly related constructs. Emotional

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reactivity refers to the intensity of the individual's emotional response, whereas emotion regulation refers to the processes involved in initiating, maintaining, and modulating this response [28, 11]. Negative emotional reactivity represents the child's tendency to react to stressors with high degrees of emotional intensity, including anger, irritability, fear, or sadness [21]. Children who are high in negative reactivity and low in their ability to regulate negative emotions are at risk for developing both externalizing and internalizing problems [10]; however, most research to date on this topic utilizes parent or teacher reports of reactivity and regulation. [21]

Although negative reactivity and regulation are frequently studied as a global higher-order construct [26], recent findings on temperament and physiology suggest that sadness, anger, and fear are sub-served by different neurological substrates [5, 7] For example, anger appears to be regulated by an approach system, whereas fear and sadness are regulated by a withdrawal system; and activity in these systems are likely related to different outcomes [21]. Rothbart, Ahadi, and Hershey (1994) found that in 6- to 7-year-old children, the regulation of fear and sadness were related to prosocial, but not antisocial outcomes, whereas the regulation of anger was predictive of aggression and antisocial activity, but not prosocial outcomes [20]. Rydell, Berlin, and Bohlin (2003) found that both anger and fear were related to prosocial behavior in their study of 5-to-8-year-old children. However, only anger was predictive of externalizing problems across contexts, while fear acted as the sole predictor of internalizing behavior problems [24].

In terms of psychopathology, irritability, frustration, and angry outbursts are common characteristics of individuals diagnosed with conduct disorder, whereas the presence of persistent and frequent sad or anxious affect are hallmark features of depressive and anxiety disorders [2]. In line with this observation, there is some evidence that susceptibility to anger and frustration may be more strongly related to externalizing problems [10, 24], whereas susceptibility to fear, anxiety, and sadness may be more strongly related to internalizing problems [17, 18, 24]. Others, however, have found more generalized and nonspecific links between emotion regulation and adjustment. For example, Silk et al. (2003) found that among adolescents, dysregulated anger and sadness were each associated with both internalizing and externalizing problems [25]. Similarly, Zeman et al. (2002) found that dysregulated anger and sadness were each predictive of children's internalizing problems [30]. Gilliom et al. (2002) found that the ability to appropriately utilize different regulatory strategies in response to anger was the most important predictor of externalizing behavior problems [14].

In sum, there is mixed evidence for the proposition that internalizing and externalizing difficulties are differentially related to patterns of emotional reactivity and regulation. Consequently, the current study examines how different types of emotional reactivity (anger and sadness) and their regulation are linked to internalizing and externalizing difficulties. The study extends extant knowledge by examining reactivity and regulation observationally in young children. Few studies examine reactivity and regulation observationally, with most current research relying on parent or teacher reports [24].

The current study replicates study design and procedures of Morris, 2010. We also utilize two samples in order to examine concurrent and

longitudinal relations among constructs. We hypothesized that anger reactivity and anger dysregulation would be associated with higher levels of externalizing problems both concurrently and longitudinally, and that sadness reactivity and dysregulation would be associated with higher levels of internalizing problems both concurrently and longitudinally.

2. Method

2.1. Participants

Sample 1. Children were recruited from public elementary schools. The sample included 48 children (23 girls, 25 boys; M age = 7 years, 1 month) ranging in age from 5.58 to 8.58 years. Fourteen of the children were in kindergarten or pre-kindergarten, with the remaining children in either first or second grade. Sixteen percent of mothers reported some high school education or having completed high school; 65% reported completing some college; and 17% reported completing college or some post college education. Data from this sample were used to analyze concurrent associations between regulation/reactivity and adjustment.

Sample 2. Children were recruited using the same procedures as in Sample 1(from public kindergarten). All of the children were in pre-kindergarten or kindergarten at the initial assessment. Parents of children were contacted two years later when children were in 1st or 2nd grade, and with parental permission, data were collected from teachers on children's adjustment. Forty-eight percent of the original sample consented for teacher participation in 1st-2nd grade. This sample included 40 children (20 girls, 20 boys; M age = 5 years, 1 month at Time 1). ANOVAs revealed no significant differences on any of the study variables for participants who ended participation and those who continued participation in 1st-2nd grade. Thus, all analyses focused on children with data from both time points. Ten percent of mothers reported completing some high school education or having completed high school; 77% reported completing some college; and 12% reported completing college or some post college education. (See table 1 for more demographic and background characteristics). Data from this sample were used to calculate the longitudinal associations between regulation/reactivity and adjustment.

2.2. Procedure

These samples were participants in a larger investigation examining the role of the family in the development of psychopathology during early childhood. Data were collected during 1.5 to 2-hour home visits (using Affect Coding Scale of Hubbard and AFFEX Coding System of Izard, Doughtery & Hembree*)*. Each mother-child dyad engaged in a series of tasks designed to assess parent-child interactions. Mothers were told to interact with their children as they normally would. Families were paid 200.000VND for their time. With parental permission, teachers were mailed questionnaires to assess the child's behavior in school. In Sample 1, teachers were mailed *Ontario Child Health Study Scales* soon after the home visit (to assess the concurrent relationship). In Sample 2, children's teachers were contacted 2 years after the home visit to complete *Ontario Child Health Study Scales*. Data from this sample is used to report longitudinal relationship between Children's Emotional Reactivity, Regulation and Adjustment.

Table 1: Demographic and background characteristics

	Sample 1 *Concurrent Assessment*	**Sample 2** *Longitudinal Assessment*
N	48	40
% female	47%	50%
Age mean (year/month)	7/1	Time 1: 5/1 Time 2: 7/1
Mother level of education		
% graduated high school	16%	10%
% completing college	65%	77%
% post college education	17%	12%
Marital status		
Married and living together	92.6%	96%
Divorced	4.3%	4.5%
Occupational status		
Employed outside the home	86.2%	84.1%
Working at home	9.3%	12%
Unemployed	2.0%	2.3%
Number children in family (mean, SD)	1.6(.6)	2.2(.9)
Monthly household monthly (mean /mil. VND)	12.2	13.2

2.3. Measures

Emotional Reactivity and Regulation. Emotional reactivity and regulation were coded from a three-minute disappointment task in which a child is given an unwanted prize. This task was adapted from Cole (1986) [8]. However, the procedure was modified to include the assessment of emotion regulation with the parent present. In this task, a child is given a prize that he or she had previously ranked as the worst prize out of 10 potential prizes (e.g., broken sunglasses, socks, a broken toy). An examiner gives the prize to the child in a paper bag while the child is seated at a table with his or her mother. The child then opens the bag and sees the toy, and the parent-child interaction is observed. After three minutes, both examiners return to the room and resolve the situation by explaining that a mistake was made and the wrong prize was given to the child. The child is then given the opportunity to choose another prize.

During each 10-second interval of the task, the intensity of anger and sadness displayed by the child were coded on a five-point scale, with a five indicating the highest degree of the expressed emotion, and a one indicating that the emotion was not expressed. Anger and sadness intensity were each coded according to the child's facial expression, tone of voice, and nonverbal emotional behaviors. Specific guidelines for emotion coding were adapted from Hubbard's (1997) Affect Coding Scale, and Izard, Doughtery, and Hembree's AFFEX Coding System (1983) [15, 16]. Reliabilities for sadness and anger in the current samples were acceptable (anger, kappa = .71 and r = .82; sadness, kappa = .70 and r = .80). Data on emotional expression/intensity were averaged across intervals in order to obtain separate *sadness and anger reactivity* ratings. Children's *sadness and anger regulation* were calculated as the duration of the expressed emotion (see Thompson, 1990) [27]. Specifically, regulation

was computed by counting the number of intervals an emotion was expressed starting from the beginning of the task until the emotion subsided. Intervals were counted until the child had a "one" for at least one interval, indicating that for at least 10 seconds, there was no sign of the emotion. Thus, higher scores indicated higher levels of dysregulated affect. There was 100% agreement for anger and sadness duration variables.

Internalizing and Externalizing Problems. Teacher report of problem behavior was assessed via a modified version of the internalizing and externalizing scales of the *Ontario Child Health Study Scales* (OCHS; Boyle, Offord, Racine, Szatmari, & Sanford, 1993) [4]. The OCHS assesses problem behavior symptoms associated with DSM-III childhood psychiatric disorders and contains items adapted from the Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1981) [1]. The OCHS has good internal consistency, test-retest reliability, and agreement with psychiatrists' diagnoses [4]. The modified OCHS contains 35 symptom items rated on a Likert-type scale ranging from 0 (*rarely applies*) to 2 (*certainly applies*). Broadband scales are computed to assess internalizing (e.g., worries about things in the future; needs to be told over and over that things are okay) and externalizing (e.g., kicks, bites, or hits other children; defiant, talks back to adults) symptoms. Chronbach's Alphas in the current study ranged from 0.95 to 0.78.

3. Results

Means and standard deviations for the study variables are presented in Table 2. Mean differences for all the study variables were examined with respect to maternal education level, child sex, child age. A significant mean difference was found for internalizing in Study 1, where girls (M = .54, SD = .27) displayed higher levels of internalizing compared to boys (M = .37, SD = .29; F = 4.00, p < .05); however, all patterns of relations held after controlling for sex in regression analyses, and there was no significant sex by emotion interactions suggesting that relations among emotion regulation/reactivity and adjustment were the same for boys and girls. It should also be noted that in both studies, children displayed significantly higher levels of sadness reactivity and dysregulation than anger reactivity and dysregulation, respectively (t's ranged from 4.01 to 34.59; see Table 2 for means and standard deviations).

Pearson correlations were calculated to examine linear relations among constructs (See Table 2 below). Contrary to expectations, children's sadness reactivity was not associated with teacher report of internalizing problems in either study. However, children's sadness dysregulation was associated with teacher report of internalizing concurrently (sample 1), but this association was not found longitudinally. As hypothesized, children's observed anger reactivity was associated with higher levels of teacher reported externalizing behavior concurrently (sample 1), and two years later (sample 2), suggesting that anger reactivity is both a correlate and predictor of externalizing problems. Anger dysregulation was associated with teacher report of externalizing behavior only in the longitudinal study (sample 2).

Table 2. Correlation Matrix and Descriptive Statistics for Major Variables

Variable	1	2	3	4	5	6	Min	Max	Mean	SD
SAMPLE 1 – Concurrent Associations										
1. Anger Reactivity	1.00						1.00	3.67	1.43	.55
2. Anger Dysregulation	.83***	1.00					0.00	15.00	2.44	3.62
3. Sadness Reactivity	.15	.04	1.00				1.50	4.59	2.52	.56
4. Sadness Dysregulation	-.05	-.10	.51***	1.00			1.50	15.00	12.42	4.12
5. Externalizing Problems	.31*	.17	-.01	.23	1.00		.00	1.65	.35	.42
6. Internalizing Problems	-.07	-.17	.14	.33*	.21	1.00	.00	1.07	.44	.29
SAMPLE 2 – Longitudinal Associations										
1. Anger Reactivity		1.00					1.00	4.44	1.38	.68
2. Anger Dysregulation	.94***	1.00					0.00	15.00	2.47	3.60
3. Sadness Reactivity	.37*	.25	1.00				1.23	4.18	2.60	.71
4. Sadness Regulation	.24	.14	.72**	1.00			3.00	15.00	12.20	4.30
5. Externalizing Problems	.37*	.40*	-.19	-.19	1.00		.00	1.51	.26	.34
6. Internalizing Problems	-.13	-.09	-.21	-.13	.34*	1.00	.00	1.36	.39	.33

Note: *p < .05, **p < .01, ***p < .00

4. Discussion

Children who displayed more intense anger in response to a structured task designed to induce disappointment were, according to their teachers, more likely than their peers to display externalizing problems in school. Additionally, children who experienced more intense anger and difficulty regulating this anger tended to exhibit higher levels of externalizing difficulties two years later. Consistent with research on impulsivity, poor attentional abilities, and "under-controlled" temperament (Belsky, Hsieh, & Crnic, 1998; Rubin, Hastings, Chen, Stewart, & McNichol, 1998), this study found that anger reactivity and dysregulation are both associated with externalizing problems, implicating anger control as an important target of intervention work aimed at reducing aggressive behaviors [3, 23].

The study also provides some support for the role of sadness dysregulation in internalizing problems. In line with Zeman et al. (2002), children who displayed difficulty regulating sadness were more prone than other children to experience internalizing problems, such as depressed affect and anxiety [30]. However, sadness reactivity and regulation were not related to internalizing problems two years later. Consistent with Eisenberg et al. (2001), but in contrast to other recent studies (Silk et al. 2003; Zeman et al. 2002), links between emotion dysregulation and adjustment followed specific pathways. Sadness dysregulation was uniquely related to internalizing problems, and anger dysregulation was uniquely related to externalizing problems [25, 30, 10]. These discrepancies in findings across studies may be partly attributable to differences in methodology, as most studies that have failed to show specific links between emotion type and adjustment relied primarily on child report of emotion dysregulation, in contrast to the observational approach used in the present study.

Several potential limitations to this study should be noted. First, both samples in this study were relatively small and provided only modest power to detect small to moderate effects. Second, the task used in this assessment

was designed to elicit children's disappointment. It is unclear whether children's responses would generalize to other contexts, and future research should consider using a range of tasks. Third, mothers were present with children during the disappointment task. Although the mothers' presence increases the ecological validity of the task, since parents are often present during real-life emotional scenarios, their involvement potentially confounds children's own efforts to regulate their emotions with their parents' attempts. An important strength of this study is the use of independent informants for all of the constructs of interest (teacher report of internalizing and externalizing problems, observer report of emotion regulation), which minimizes shared informant bias and helps maintain the independence of constructs. Another strength of the current study is the observational method used to assess emotion regulation. Most previous research on emotion regulation in this age group has relied on parent and teacher reports of children's emotionality and emotion management [21]. Moreover, observational studies of emotion regulation typically have examined children's overall emotional distress or negativity, and not the specific emotion expressed or the dynamics of emotional expression [29].

Although we did find evidence linking reactivity and regulation to child adjustment, several hypotheses were not supported. Surprisingly, anger regulation was not related to externalizing problems concurrently; even though it was related to externalizing problems two years later, and anger reactivity was associated with externalizing problems concurrently. Moreover, it should be noted that anger dysregulation and reactivity are highly correlated in both samples, suggesting that there may be little difference among these constructs as they were empirically assessed in the present study. In contrast, sadness reactivity and regulation were only moderately correlated in both samples. Nevertheless, anger and sadness regulation and reactivity had different patterns of associations with adjustment, suggesting the value of assessing these constructs separately. The lack of associations between sadness reactivity and concurrent internalizing was also unexpected, as were the lack of associations between sadness reactivity and regulation with internalizing problems two years later. This lack of association may be partly related to the use of teachers as reporters of children's internalizing. Although young children's externalizing symptoms are usually obvious in a classroom setting, children's internalizing symptoms pose less of a problem for teachers and are less overt. Multi-reporter assessments of children's internalizing symptoms, including parent and child report, may be helpful in clarifying the relation between emotion regulation and internalizing problems in future studies.

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