MOM IS DISTRESSED, BUT I'M SMILING: CHILD POSITIVE AFFECT AS A PROTECTIVE FACTOR IN THE CONTEXT OF MATERNAL EMOTION DYSREGULATION

by

MOLLY FAYE DAVIS

(Under the Direction of Cynthia Suveg)

ABSTRACT

Little is known about how processes underlying maternal psychopathology, such as emotion dysregulation (Edys), are related to children's adjustment problems. Further, scant research has explored child protective factors that can buffer these associations. The present study used a multi-method approach to examine whether child positive affect (PA) can serve as a protective factor in the relations between mothers' Edys and children's adjustment problems. The sample included 96 mothers and their preschool-age children. Mothers' Edys was assessed via self-report and physiological assessment. Child PA and adjustment problems were measured using maternal report. Child PA significantly moderated the relations between maternal physiological Edys and child internalizing and externalizing problems as well as between maternal self-reported Edys and child internalizing, but not externalizing, problems. These results suggest high PA can facilitate child adjustment in the context of low maternal Edys.

INDEX WORDS: Emotion dysregulation, Respiratory sinus arrhythmia, Child positive affect, Adjustment

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MOLLY FAYE DAVIS

B.A., Emory University, 2012

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

MASTER OF SCIENCE

ATHENS, GEORGIA

2014

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MOLLY FAYE DAVIS

Major Professor:	Cynthia Suveg
Committee:	Ronald Blount
	Anne Shaffer

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
May 2014

ACKNOWLEDGEMENTS

First, I would like to thank my mentor, Cindy Suveg, for her support and guidance throughout this project. Her mentorship has been invaluable to this manuscript. I would also like to thank the members of my committee, Drs. Ronald Blount and Anne Shaffer, for their thoughtful feedback throughout this process. I would like to acknowledge both undergraduate and graduate research assistants who have assisted with data collection and editing for this project. Additionally, this work was funded by the Institute for Behavioral Research at the University of Georgia as well as by a National Institute on Drug Abuse (P30 DA027827) Parent Grant awarded to the University of Georgia Center for Contextual Genetics and Prevention Science.

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CHAPTER 1

INTRODUCTION

Purpose of the Study

The purpose of this study was to understand whether child positive affect (PA) could buffer the positive association between maternal emotion dysregulation (Edys) and preschoolers' adjustment problems. Given that Edys is characteristic of many, if not all, forms of psychopathology, studying this transdiagnostic indicator of maladaptive functioning provided information regarding how difficulties in mothers' core emotional processes relate to important child outcomes. The present study was the first to examine whether PA can buffer the negative influence of maternal Edys on child adjustment problems. This study has potential prevention and intervention implications by identifying maternal Edys and child PA as targets for promoting child adjustment and mitigating the development of psychopathology in young children.

How This Study is Original

This study is original because it used a multi-method approach to study processes underlying maternal psychopathology in relation to childhood adjustment problems. This was the first study to investigate the role of both self-report and psychophysiological indices of maternal Edys in these child outcomes. Furthermore, this was the first known study to examine protective factors in this context using a preschool-age sample.

Expected Results

Based on empirical and theoretical literature (Han & Shaffer, 2012; Morris, Silk, Steinberg, Myers, & Robinson, 2007), it was hypothesized that mothers' Edys would be significantly, positively related to children's internalizing and externalizing problems. Additionally, literature suggests child PA can serve a protective function in many adverse contexts (Lengua, 2002; Silk, Shaw, Forbes, Lane, & Kovacs, 2006). Therefore, it was expected that child PA would moderate the associations between maternal Edys and child internalizing and externalizing problems. Specifically, it was hypothesized that the relations between mothers' Edys and child adjustment problems would be strongest in the context of low child PA and weakest in the context of high PA.

Literature Review

It is well-established that children of mothers with psychopathology experience a wide array of adverse outcomes including internalizing and externalizing problems (Goodman et al., 2011; Suveg, Shaffer, Morelen, & Thomassin, 2011; Trapolini, McMahon, & Ungerer, 2007). In accordance with a developmental psychopathology perspective, it is crucial to move beyond the extant literature to understand how the processes that underlie maternal psychopathology, such as difficulties with emotion regulation (ER), relate to these important indices of child adjustment problems. Emotion regulation has been defined as the processes by which individuals influence their emotional experiences and expressions, either automatically or through intentional control (Gross, 1998), and difficulties in ER (i.e., emotion dysregulation) have been implicated in diverse forms of psychopathology in both youth and adult populations (Bradley et al., 2011; Suveg & Zeman, 2004). The theoretical and empirical literatures collectively suggest that emotion dysregulation (Edys) is a transdiagnostic indicator of maladaptive functioning. In light

of some empirical support for the role of maternal Edys in children's adjustment problems during middle childhood (Han & Shaffer, 2012), the present study examined whether these relations can be identified as early as the preschool period. The identification of factors contributing to internalizing and externalizing problems during the preschool period is crucial given the potential for the prevention of long-term maladaptation (Mesman & Koot, 2001).

Within the intergenerational transmission of psychopathology literature, most studies have focused on risk, neglecting to consider protective factors. Current empirical and theoretical work suggests child positive affect (PA) is a promising protective factor to consider (see Davis & Suveg, 2013 for a review; Fredrickson, 1998; Lengua, 2002). The present study will focus on PA as a component of temperament (Rothbart 2011). Measures of temperamental, or trait, PA include behaviors such as smiling and laughing (Gartstein and Rothbart 2003; Rothbart et al. 2001), which in this case, represent largely inherent, enduring behavioral tendencies. Positive emotions have been found to be protective amongst children exposed to diverse forms of adversity such as parental divorce and maternal depression (Lengua, Sandler, West, Wolchik, & Curran, 1999; Silk et al., 2006). Furthermore, literature indicates PA can "undo" the effects of negative emotions (Fredrickson, 1998). Thus, the present study explored whether child PA can protect against childhood adjustment problems amongst children whose mothers are experiencing Edys (see Figure 1.1).

This study relied on a multi-method approach that included mothers' reports of their own, as well as their children's, behavior, in addition to physiological assessment of maternal ER using respiratory sinus arrhythmia (RSA) suppression values. The present study contributes substantively to the literature by examining whether important processes underlying maternal psychopathology relate to children's adjustment problems during the preschool years and in turn,

whether child PA can serve to buffer those associations. Given that Edys is characteristic of many, if not all, forms of psychopathology, studying this underlying process can shed light on how difficulties in mothers' core emotional processes relate to important child outcomes. Furthermore, by focusing on such processes rather than discrete diagnoses, we were able to study the role of varying levels of maternal dysfunction, including subclinical levels of dysfunction, in child development. Developing a greater understanding of PA as protective factor in this context can allow for a better understanding of resilience in youth. As a result, this research can aid in the formation of intervention and prevention efforts to promote children's psychosocial adjustment, and thus protect against the development of psychopathology, in young children.

Maternal ER and Child Adjustment

In general, Edys can comprise difficulties in emotional awareness, appraisal of the likely effects of emotions, emotional clarity and/or control of emotional experience and expression (Dix, 1991; Gratz & Roemer, 2004). Support for the role of mothers' Edys in children's adjustment problems stems primarily from theoretical work. Dix (1991) hypothesizes that parents' ability to regulate their own emotions serves to control the affective information parents convey to their children and thus the behaviors children are likely to have. Problems with emotional expression or experience that result from a parent's failure to regulate their own emotions can lead to adverse developmental outcomes for the child while also negatively impacting the parent-child relationship (Dix, 1991). Likewise, Eisenberg, Cumberland, & Spinrad (1998) posit that emotion-related parenting practices such as parents' emotional expressiveness influence children's emotional experiences and expressions and, as a result, their socioemotional competence.

The Tripartite Model of the Impact of Family on Children's Emotion Regulation and Adjustment (Morris et al., 2007) extends the work of Eisenberg et al. (1998) through its explicit discussion of modeling effects with regard to ER. As depicted in the Tripartite Model of the Impact of Family on Children's Emotion Regulation and Adjustment, children's observations of their parents' ER abilities influence children's overall adjustment (i.e. internalizing, externalizing, and social competence) as well as their own ER. Therefore, when mothers fail to model adaptive ER strategies, their children can develop difficulties with ER and, in turn, can develop adjustment problems. On the one hand, it is likely that parents who are well-regulated are sensitive and attuned to their child and thus able to provide adequate opportunities for adaptive socioemotional development. On the other hand, mothers who are emotionally dysregulated may lack the emotional resources needed to be responsive to their children. As a result, these mothers likely miss chances to engage in positive interactions with their child, therefore increasing the probability that the child will experience socioemotional maladjustment. While limited empirical research has explored such modeling effects, consistent with these theoretical notions, some empirical research has found mothers and children use similar ER strategies (Garber, Braafladt, & Zeman, 1991).

Though literature exists to support the role of maternal modeling of emotions in children's emotional development, limited empirical work has specifically investigated the influence of mothers' Edys on child development. One study examined the role of mothers' Edys in child internalizing and externalizing problems using cluster and moderation analyses (Han & Shaffer, 2012). Results indicated that mother's Edys was significantly, positively associated with child internalizing problems for children ages 8 to 11. Also, children's negative Edys moderated this relation such that the positive association between mothers' dysregulation

and child internalizing symptoms was found for children who had more self-reported problems with negative emotions but less parent-reported and observed problems in this domain. Therefore, the positive association between mothers' Edys and child internalizing problems was found only for children who utilized a more internalizing coping style with regard to negative emotions. Han and Shaffer (2012) concluded that children who are aware of their own emotional difficulties but do not express these difficulties in noticeable ways may be at particular risk in the context of maternal Edys given that their mothers are likely less able to recognize their needs for emotional assistance. Mothers' Edys was not significantly associated with child externalizing problems at the bivariate level nor was child Edys a significant moderator of this association.

Scant research has examined behavioral indices of maternal Edys in relation to child adjustment and no known research has explored physiological indices of maternal Edys in this respect. One psychophysiological measure pertinent to ER is respiratory sinus arrhythmia (RSA), an index of vagal tone that reflects the influence of the vagus (i.e. the tenth cranial nerve) on the heart and provides information regarding parasympathetic nervous system activation (Porges, Doussard-Roosevelt, & Maita, 1994). Specifically, RSA suppression, which is indicative of vagal withdrawal, is operationalized as a decrease in RSA from baseline to a challenge task requiring regulation (e.g. Calkins, Graziano, Berdan, Keane, & Degnan, 2008). Though research indicates excessive withdrawal may be maladaptive and that, in some instances, increases in RSA may be optimal (for a review, see Beauchaine, 2001; Butler, Wilhelm, & Gross, 2006), RSA suppression has often been associated with regulatory behavioral processes such as ER, mainly in children (e.g. Blandon, Calkins, Keane, & O'Brien, 2008; Calkins & Dedmon, 2000; Calkins & Keane, 2004). Additionally, literature has demonstrated a connection between the failure to exhibit sufficient RSA suppression among adults and college students and

the presence of psychopathology symptoms and disorders (e.g. Movius & Allen, 2005; Rottenberg, Clift, Bolden, & Salomon, 2007). Greater RSA suppression has even been found to predict adults' later recovery from depression (Rottenberg, Salomon, Gross, & Gotlib, 2005). Examining maternal Edys at a physiological level may provide an objective index of this construct because it is perhaps less likely influenced by social desirability than observational and self-report measures of ER.

Child PA as a Moderator

Theory and research suggest PA serves as a protective factor in many contexts. For instance, Fredrickson's broaden-and-build theory of positive emotions states that positive emotions broaden the scope of an individual's thoughts and actions, thus building enduring personal resources such as physical, intellectual, and social resources (Fredrickson, 1998). As a result, positive emotions should lead to enhanced well-being and coping and therefore build resilience (Fredrickson, 2002). The undoing hypothesis of the broaden-and-build theory suggests that positive emotions undo the effects of negative emotions (Fredrickson, 1998), indicating positive emotions can serve to regulate negative emotions. Furthermore, a recent review paper by Davis and Suveg (2013) emphasizes the importance of examining child PA as a moderator of the associations between various contextual factors and indices of child adjustment and maladjustment. Specifically, the transactional model of child PA (Davis & Suveg, 2013) suggests that under certain conditions, child PA may confer protection against psychosocial maladjustment.

Empirically, research has not assessed PA as a protective factor in the specific association between mothers' Edys and child adjustment problems, though child PA has been studied in various risk contexts. For instance, child PA has been found to moderate the association

between maternal depression and internalizing problems for a cross-sectional sample of children ages 4 to 7 (Silk et al., 2006). Silk et al. (2006) coded children's displays of ER, including the maintenance or up-regulation of PA, as children waited for a highly desirable object (cookie or toy). Children who exhibited PA while waiting for the desired object had lower mother-reported internalizing symptoms. These findings were particularly evident for children whose mothers had a history of childhood-onset depression and were currently experiencing depressive symptoms. This indicates children's positive emotions are likely important for buffering against the development of adjustment problems.

Indeed, PA has been linked to resilience (Lengua, 2002; Tugade & Fredrickson, 2004), which has been defined as the "maintenance of high levels of positive affect and well-being in the face of significant adversity" (Davidson, 2000). Specifically, PA has been found to promote adjustment for children of divorce (Lengua, et al., 1999), children of alcoholic parents (Carle & Chassin, 2004) and children experiencing multiple risk factors (Lengua, 2002). For instance, Lengua (2002) investigated the relations between multiple psychosocial (e.g., negative life events, maternal depression) and environmental (quality of home and neighborhood environment) risk factors and children's socioemotional adjustment (based on parent and child report) for a cross-sectional sample of third through fifth graders. Resilience was measured using a combination of the adjustment indices and the number of risk factors present (i.e. positive adjustment and low levels of adjustment problems when multiple risk factors were present). Lengua (2002) found that a composite of parent- and child-reported PA predicted positive adjustment beyond the effects of multiple risk and that PA was also associated with resilience. Though not measured, it is likely that parents were experiencing Edys, at least to

some extent, in these various contexts and, therefore, that child PA was buffering the negative impact of parental Edys on child adjustment.

While the mechanisms by which PA can confer protection against maladaptation in childhood have yet to be identified, it is clear that PA can serve a protective function across a wide range of adverse circumstances and developmental outcomes. Presumably, children experiencing adaptive levels of PA have developed coping strategies that promote adjustment in the face of adversity. Additionally, children who exhibit more PA may invite more positive reactions from others (Sroufe, Schork, Motti, Lawroski, & LaFreniere, 1985). Therefore, even in the context of adversity, these children likely have opportunities to further develop their emotional and behavioral abilities through positive interactions with others. Overall, mothers experiencing Edys are likely less able to respond to their children's difficult temperaments. Children high in PA likely need fewer emotional resources from their mothers, thus potentially weakening the negative association between mothers' Edys and child internalizing and externalizing problems.

Current Study and Hypotheses

This study sought to extend the extant literature in several ways. First, the present study used a multi-method approach, which included mothers' self-reports, mothers' reports of child behavior, and psychophysiological data. Second, this study focused on a community sample of racially and economically diverse preschoolers and their mothers, making it the first known study to examine the relations between mothers' Edys and child adjustment in this age group. Third, by examining mothers' Edys rather than discrete psychological disorders, this study adhered to a developmental psychopathology approach, focusing on deviations in the typical process of maternal ER as they relate to children's internalizing and externalizing problems.

Lastly, whereas most literature has examined risk factors for child internalizing and externalizing problems, the present study examined PA as a protective factor, thus examining whether PA can buffer against the onset of these problems. Because literature suggests offspring of mothers experiencing Edys are likely at risk for maladaptive outcomes, understanding specific protective factors implicated in this association is important for identifying targets for prevention and intervention efforts.

Hypotheses

1. Greater maternal Edys will be associated with higher levels of child internalizing and externalizing problems.

2. The relationship between mothers' Edys and child adjustment problems will be strongest in the context of low child PA and weakest in the context of high PA.

CHAPTER 2

METHOD

Participants

This study included 98 mothers (*M* age = 30.48 years, SD = 6.09) and their 36-60-month-old children (*M* age = 3.52 years, *SD* = .52, 59.40% male). Participants were recruited through fliers posted in the community. Since this study was part of a larger project that involved genetics data collection, only biological mothers and their children were included in the study. Mothers and their children were required to be fluent in reading and speaking in English. Mothers were excluded if they were currently pregnant. Children with a developmental disability that would hinder their ability to fully participate in the lab visit were also excluded.

The present sample was diverse economically and racially. The majority (51.00%) of women identified as Black; 38.50% indicated they were Caucasian; 1.00% were Asian; 4.20% were Hispanic; and 5.20% identified as “other”. Most families (53.30%) had a total household income of less than $30,000; 8.70% were between $30,000 and $39,999; 5.40% were between $40,000 and $49,999; 2.20% were between $50,000 and $59,999; 6.50% were between 60,000 and 69,999; 7.60% were between $70,000 and $79,999; and 16.30% had a total income above 80,000. For marital status, 44.20% of mothers indicated they were currently married; 45.30% reported they had never been married; 3.20% were separated; 3.20% were divorced; 2.10% were widowed; and 2.10% were engaged. With regard to the mothers’ education levels, 20.80% had graduate school training; 26.00% were college graduates; 20.80% had some college training;

30.20% had their General Equivalency Diploma (GED), high school diploma or less; and 2.10% described their education level as “other.”

Procedures

Mothers participated in a phone screening with a research assistant to determine their eligibility for the study based on the aforementioned criteria. Mothers received a packet of measures in the mail to complete prior to their lab visit. Mothers who did not complete the measures prior to the lab visit filled them out the day of the visit. At the lab visit, mothers provided consent and their children provided assent to participate. To collect RSA data, electrodes were placed on the mother and child before the behavioral observation tasks began. This study utilized data from the baseline and speech segments. During the baseline segment, the mother and child were instructed to sit still for 4 minutes with their hands resting on the table. For the speech task, the mother had 2 minutes to prepare a speech regarding her philosophy of parenting. The speech task was a modified version of the Trier Social Stress Test (Kirschbaum, Pirke, & Hellhammer, 1993), an experimental paradigm akin to a job interview that is meant to induce moderate, short-lived psychological stress. The mothers then had 5 minutes to deliver their speech, without using any notes, to a graduate research assistant who remained neutral throughout the task in order to provoke additional stress. The child was in a separate room for the duration of the speech task and mothers were debriefed directly following the completion of this task. All behavioral observation segments were video-recorded. Parents were compensated $100 for their participation and children chose a small prize.

Measures

Maternal ER

Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The DERS is a 36-item self-report measure; mothers responded to each item on a 5-point Likert scale. The present study relied on the total score, which indicated mothers' overall ER difficulties. The DERS has good psychometric properties including test-retest reliability, internal consistency and acceptable validity in terms of construct and predictive validity (Gratz & Roemer, 2004). Cronbach's alpha for the present study was .93.

RSA. RSA data was collected for mothers during the speech task using MindWare BioLab 3.0.6 software and analyzed using MindWare HRV 3.0.17 software (MindWare Technologies, Ltd., Gahanna, OH.) in 30-second epochs following recommendations of the Society for Psychophysiological Research committee on heart rate variability (Berntson et al., 1997). The EKG signal was digitized at 1000 Hz and MindWare created an interbeat interval (IBI) series. An algorithm developed by Bernston, Quigley, Jang, and Boysen (1990), as well as visual scanning, was used to detect artifacts. Artifacts were manually removed. In accordance with previous research (Blandon, et al., 2008), epochs in which greater than 10% of the data points were artifact were removed from subsequent analyses. MindWare calculated respiration rate in milliseconds from the signal from Z_o and the signal is processed using a Fast Fourier Transformation (FFT). Impedence cardiography was used to monitor respiration (Ernst, Litvack, Lozano, Cacioppo, & Berntson, 1999). The software calculated a 4 Hz time series using interpolation (e.g. Berntson, Cacioppo, & Quigley, 1995), then the time series was linearly detrended using the second order polynomial in order to minimize nonstationaries in the data (Litvack, Oberlander, Carney, & Saul, 1995). The Hamming Function for Spectral Analysis with

respiratory frequency bands set at .12-.4 Hz was used to taper the residual series and the time series underwent FFT to determine the spectral distribution (Mindware HRV Module, Gahanna, OH). Based on MindWare's calculations, RSA represented the integral power within the respiratory frequency band, which was equivalent to the statistical variance of the time series between the band. For analyses, RSA suppression values were computed for each of the mothers. First, mean scores for participants' RSA during the baseline and speech tasks were calculated separately. To calculate the mean, participants were required to have a minimum of two usable epochs for a given task. RSA suppression was calculated by subtracting mothers' mean RSA values during the speech task from their mean baseline RSA values, following procedures outlined in other studies (e.g. Calkins, et al., 2008). Positive change scores indicated a decrease in RSA from baseline to the speech task and thus RSA suppression. Greater RSA suppression was indicative of greater ER. Speech tasks similar to the one used in the present study have been implemented in the adult literature to examine changes in RSA (e.g. Rottenberg et al., 2007).

Child PA

The Children's Behavior Questionnaire (CBQ; Rothbart, Ahadi, Hersey, & Fisher, 2001). The CBQ assessed temperament in children ages 3 to 7 using 195 items. Mothers rated their children's behaviors during the past 6 months using 7-point scales for each item from 1 (Never) to 7 (Always). Caregivers had the option to rate an item as "not applicable." This study used the Smiling/Laughing subscale of the CBQ to measure child trait PA, with higher scores on this scale indicating higher levels of smiling and laughing. Each of these values represented the mean of scores for available items on this subscale. Acceptable internal consistency for the CBQ scales has been found across studies and high levels of parent agreement have been found

(Rothbart, et al., 2001). Cronbach's alpha for the Smiling/Laughing subscale in this study was .81. Despite research that indicates that mothers' experiencing emotional difficulties, such as depressed mood, rate their children's temperament as being more negative (Whiffen, 1990), some findings suggest such factors may not significantly bias mothers' reports of child PA (Forman et al., 2003). Overall, maternal reports of child temperament provide useful data, especially during early ages when temperament assessment options are relatively limited.

Child Adjustment

Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000). Parents filled out the CBCL regarding their children's psychosocial functioning during the past 6 months. The CBCL includes 100 items rated on a 3-point Likert scale, (0 *not true,* 1 *somewhat or sometimes true,* and 2 *very true or often true*) and yields two broadband scales: Internalizing Problems and Externalizing Problems. The Internalizing Problems scale includes items relating to children's anxious, depressed and withdrawn behaviors in addition to their somatic complaints. The Externalizing Problems scale measures children's delinquent and aggressive behaviors. The CBCL has favorable psychometric properties (Achenbach & Rescorla, 2000) and Cronbach's alpha for the Internalizing and Externalizing scales for the present sample were .84 and .91, respectively. Of note, in the present sample, 8.30% of children were in the at-risk (T score of 60-63) or clinical (T scores greater than 63) ranges for the Internalizing Problems scale. Similarly, 10.40% of children were in the at-risk or clinical ranges for Externalizing Problems.

Analytic Plan

A power analysis using G*Power indicated that 68 participants were needed for a power level of 80% (p = .05) and a moderate effect size (f^2 =.15).

Pearson bivariate correlations were computed between the independent variable (mother's Edys), dependent variables (child internalizing and externalizing problems) and moderator (child PA), all of which were continuous variables.

Before conducting moderation analyses, multicollinearity between the independent variable and moderator (i.e. first-order terms) and the interaction terms (i.e. higher-order terms) was reduced through the use of centering (Aiken & West, 1991). For the moderation analyses, the publicly-available PROCESS SPSS macro plug-in (http://afhayes.com/introduction-to-mediation-moderation-and-conditional-process-analysis.html; Hayes, 2012), which relies on a path analysis framework, was used. In PROCESS, moderation was present when the interaction term between the predictor (mothers' Edys) and the moderator variable (child PA) was significant and the confidence interval did not include zero. Therefore, a moderator variable should impact the direction and/or strength of the relations between the independent and dependent variables (Baron & Kenny, 1986). PROCESS allows the researcher to probe an interaction in several ways, all of which require fewer calculations than would be necessary in most other regression approaches (Hayes, 2012). For the present study, the interactions were probed by examining conditional effects (i.e. simple slopes) at low (-1 *SD* below the mean) and high (+1 *SD* above the mean) levels of child PA. Separate moderation models were run for child internalizing and externalizing problems.

Missing Data

Paired-Samples T Tests were conducted to assess whether any given 30-second epoch of the baseline or speech tasks differed significantly from multiple other epochs for that task in terms of having greater percent error and missing data. No epochs were excluded based on this criteria. Additionally, 5 participants had a mean baseline RSA value that was 2 standard

deviations above or below the mean for the sample, leaving 66 participants with usable RSA suppression values. This approach is similar to, but more conservative than that of Movius and Allen (2005), who excluded participants with resting RSA values 3 standard deviations above or below the mean for the sample.

For the DERS, because all scale scores are used to calculate the total score, means for 3 participants' scale scores were imputed for missing values when no more than 1 item on a scale was missing. Participants missing more than 1 item (i.e. more than 20%) for a given scale were excluded from analyses, in line with other studies such as Phillips and Power (2007). For an ER self-report measure, Phillips and Power (2007) only included participants with less than 20% of items missing on a given scale in subsequent analyses involving that scale. Overall, 94 mothers had sufficient DERS data to be included in subsequent analyses.

One mother did not fill out either the CBCL or the CBQ. Additionally, two other mothers were each missing either the CBCL or CBQ, thus leaving 96 participants with adequate available data for each of these measures of child behavior.

CHAPTER 3

RESULTS

Pearson bivariate correlations were conducted to examine relations between the independent (mothers' physiological and self-reported Edys), dependent (child internalizing and externalizing problems) and moderator (child PA) variables. Descriptive statistics for each of these variables are presented in Table 3.1. Table 3.2 presents the bivariate correlations. In support of our first hypothesis, mothers' self-reported Edys was significantly, positively correlated with child internalizing and externalizing problems. However, mothers' physiological Edys was not significantly correlated at the bivariate level with either of these indices of child adjustment problems.

Upon centering the independent and moderator variables, moderation analyses were conducted using 95% confidence intervals. To examine whether the associations between maternal Edys and child internalizing and externalizing problems were influenced by child sex, socioeconomic status (i.e. total household income), marital status, or child race, simple moderation models were run. Each of these demographic variables was entered as the sole moderator in each model. Models were separately tested for each independent and dependent variable. Because none of these demographic variables produced significant moderation effects, the following moderation analyses are presented without race, socioeconomic status, sex or marital status as covariates.

Child PA significantly moderated the relations between mothers' physiological Edys and child internalizing and externalizing scores (see Figures 3.1 and 3.2). In the context of high PA,

children whose mothers exhibited low levels of physiological Edys showed lower levels of internalizing, b = -6.00, p = .01, and externalizing, b = -6.64, p = .006, problems than children high in PA whose mothers exhibited high levels of Edys. In fact, in the context of high child PA, children whose mothers were low in Edys exhibited the lowest levels of symptoms.

The model with internalizing problems as the outcome variable also included significant conditional effects at low levels of PA such that in the context of low child PA, children whose mothers showed low levels of physiological Edys exhibited greater levels of internalizing problems than children whose mothers showed high physiological Edys, b = 5.88, p = .006.

Moderation analyses were then run using mothers' self-reported Edys as the independent variable. Child PA significantly moderated the positive association between maternal self-reported Edys and internalizing problems (see Figure 3.3). In the context of high PA, children whose mothers reported low levels of Edys showed lower levels of internalizing problems than children high in PA whose mothers reported high levels of Edys, b = 0.19, p = 0.0001. In fact, in the context of high child PA, children whose mothers were low in Edys exhibited the lowest levels of internalizing problems. Child PA did not significantly moderate the positive association between mothers' self-reported Edys and child externalizing problems. Results of all moderation analyses are presented in Tables 3.3 and 3.4.

CHAPTER 4

DISCUSSION

The present study was the first, to our knowledge, to not only examine both maternal self-reported and physiological Edys in relation to preschoolers' adjustment problems but also to empirically assess the role of PA as a protective factor in these associations. Results from this study contribute meaningfully to the extant literature by delineating how a transdiagnostic marker of maladaptive maternal functioning relates to young children's internalizing and externalizing problems. Moreover, we demonstrated the role of child PA as a moderator in the relationships between maternal EDys and child adjustment difficulties.

We found some support for hypothesis one in that greater maternal self-reported Edys was significantly associated with higher levels of child internalizing and externalizing problems. This positive correlation between maternal self-reported Edys and child internalizing problems is in line with research conducted in middle childhood that found a similar association (Han & Shaffer, 2012). Therefore, the present study builds upon the work of Han and Shaffer (2012) by demonstrating that greater mother-reported Edys is associated with higher levels of child internalizing problems as early as the preschool period. The fact that the present study found a significant, positive relationship between maternal self-reported Edys and child externalizing problems, unlike Han and Shaffer (2012), suggests that perhaps the role of maternal Edys in such problems shifts across the developmental trajectory. It is possible that maternal Edys plays a particularly critical role in children's acting out behaviors during the preschool period, when, despites increases in self-regulation, children's abilities to regulate on their own are very much

continuing to develop (Kopp, 1982). Therefore, preschoolers are likely still quite reliant on their parents to model appropriate regulatory behaviors. In contrast, in middle childhood, children may look increasingly to their peers and others in their social environment as models for regulatory processes that are pertinent to externalizing behaviors. However, given that scant empirical research has assessed the relations between maternal Edys and child internalizing and externalizing problems, more research is needed to clarify the discrepant results. Specifically, longitudinal research is necessary to track the relations between maternal Edys and child adjustment problems over time.

Alternatively, mothers' physiological Edys was not directly correlated with child internalizing or externalizing problems. There are several potential explanations for the lack of correlation. First, there was considerable individual variability in the change scores from the baseline to speech task, which is not entirely surprising given the variability in RSA responses to such tasks that has been demonstrated in the extant literature. Though previous research has supported the ability of similar tasks to produce decreases in RSA (e.g. Burleson et al., 2003), others have found that individuals may not exhibit decreases in RSA to such tasks and may in fact show increases (e.g. Rottenberg et al., 2007). For instance, Rottenberg et al. (2007) found that, in general, depressed individuals showed increased RSA in response to a speech task while healthy controls demonstrated vagal withdrawal. Based on the variability in RSA suppression scores found in our study and the extant literature more broadly, it seems that RSA suppression is a complex construct that functions differently depending on context. This suggests that physiological EDys should be examined in relation to other variables in terms of moderation analyses that allow for the consideration of contextual factors rather than at the bivariate level. Second, the present study included a diverse sample with a significant percentage of ethnic

minority and economically-disadvantaged participants. Such demographic characteristics have been conceptualized as familial risk factors (e.g. Sameroff & Rosenblum, 2006; Shaffer, Suveg, Thomassin, & Bradbury, 2012) and thus likely serve as stressors, which may decrease the likelihood of RSA suppression during a challenge task, similar to the presence of depression (Rottenberg et al., 2007). In fact, some research suggests that cardiovascular activity can vary as a function of demographic variables such as ethnicity and socioeconomic status (e.g. Steptoe, Feldman, Kunz, Owen, Willemsen, & Marmot, 2002; Wang, Thayer, Treiber, & Sneider, 2005). To test the possibility that the degree of RSA suppression varied by ethnicity and socioeconomic status, we retrospectively examined differences in RSA suppression scores based on these demographic variables. We did not find significant differences in the average RSA suppression scores between participants who identified as Caucasian and those who were an ethnic minority [$t(64) = 1.20$, $p = .24$] and between mothers with a total household income of less than $30,0000 and those with an income greater than $30,000 [$t(61) = -.187$, $p = .64$]. Thus, this explanation is not likely, at least in the current sample. Additional multi-method assessments that examine RSA suppression using speech, as well as other types of stressor, tasks will be helpful for building upon the current study, which was the first to examine maternal physiological Edys in relation to child internalizing and externalizing problems.

With regard to our second hypothesis that child PA would moderate the association between maternal Edys and child adjustment problems, we found that high levels of PA facilitated adaptive development when maternal physiological Edys was low. When maternal physiological Edys was high, however, children high in PA still showed higher levels of internalizing and externalizing problems than when maternal Edys was low. This suggests that child PA may have a facilitative effect in the context of low maternal physiological Edys rather

than serving a protective function when physiological Edys is high. It seems that children high in PA may flourish when their mothers are also low in Edys. However, high child PA on its own may not be sufficient to confer protection in the context of greater levels of maternal Edys. Future research should consider additional child characteristics such as ER that, together with child PA, may serve a protective function under such conditions.

An unexpected finding emerged that showed that when maternal physiological Edys was low, children low in PA exhibited greater levels of internalizing problems whereas when maternal physiological Edys was high, these children showed lower levels of internalizing problems. It is possible that children low in PA are able to compensate for these deficits by relying on other emotional abilities, such as adaptive ER strategies, when their mothers are dysregulated. However, given that this finding is notably discrepant from theoretical and empirical research, which suggests that, in general, children are more well-adjusted when maternal Edys is low than when it is high (e.g. Han & Shaffer, 2012; Morris et al., 2007), it would be premature to over-interpret this finding. Furthermore, this finding should be interpreted with caution given that this was the only model out of four that showed a significant conditional effect involving low PA. Replication of this finding is necessary to determine whether such patterns can be observed consistently across studies. Nonetheless, on the whole, it seems that children low in PA are at risk for adjustment problems, particularly in the internalizing domain, even when their mothers exhibit low levels of Edys.

Similar to the moderation results involving maternal physiological Edys, we found that high levels of child PA facilitated child adjustment in the context of low maternal self-reported Edys, though only when child internalizing problems was the outcome. Therefore, these results, in conjunction with those in which maternal physiological Edys was the independent variable,

suggest that high levels of child PA can promote adjustment in this domain when maternal Edys is low, leading these children to flourish. The finding that child PA did not significantly moderate the positive association between maternal Edys and child externalizing problems can perphaps be understood in the context of the extant literature. Whereas some research suggests child PA is negatively associated with externalizing problems (e.g. Lengua, West, & Sandler, 1998), other literature has indicated high levels of positive emotions can be linked to greater levels of child externalizing problems (Degnan et al. 2011; Hayden, Klein, & Durbin, 2005; Rothbart, Ahadi, & Hershey, 1994; Zhou, Lengua, & Wang, 2009). In particular, exuberance, which includes very high levels of PA and other approach behaviors (Stifter et al. 2008), during infancy and toddlerhood has been found to predict both positive social functioning and externalizing problems in early childhood (Degnan et al. 2011; Stifter et al. 2008). High levels of emotion, whether positive or negative, may be harder to regulate (Rydell et al., 2003) and, as a result, may be overwhelming to the child. Moreover, in certain circumstances, high levels of positive emotional expression may be overwhelming to others. For instance, literature suggests that in some contexts including the classroom, high levels of positive emotion may be disruptive (Cole et al. 1994). However, it is likely that in other contexts where exuberance is valued (e.g. dance or acting classes), more extreme displays of positive emotion may facilitate adaptive psychosocial adjustment. Regardless, high child PA may not uniformly protect against the development of adjustment problems (Davis & Suveg, 2013). The consideration of additional biological and environmental contextual factors is needed to better understand the role of child PA in externalizing problems, as well as other indices of maladjustment, during the preschool period.

The present study provides a meaningful contribution to the extant literature given that it is the only known study to examine the relations between maternal physiological and self-reported Edys and child adjustment problems during the preschool period. The findings from this study help to elucidate the role of maternal Edys in preschoolers' adjustment problems across multiple levels of analysis. Furthermore, this study expanded on previous research, which has primarily focused on risk factors for child maladjustment, by investigating PA as a protective factor in the context of maternal Edys. By recruiting a racially and economically diverse sample, this study demonstrated how these processes operate in families from many different backgrounds, including socioeconomically disadvantaged families. Given that PA seems to facilitate child adjustment when maternal Edys is low, findings from the present study indicate that child PA and maternal Edys may be two important targets of future prevention and intervention efforts.

Limitations of this study are noted. The data was cross-sectional, precluding conclusions about the directionality of the observed relations. Longitudinal research examining PA as a moderator in the associations between maternal Edys and child internalizing and externalizing problems over time will be important for examining potential transactional relations between these variables while also understanding how these relations unfold across the developmental trajectory. The present study also relied on a single index of child PA. The CBQ was useful for assessing the role of trait PA as a moderator of the associations between maternal Edys and child adjustment problems, however, it provided a narrow focus for studying child. Future research would benefit from a multi-method assessment of this construct. For instance, the inclusion of behavioral observations of child PA may elucidate whether momentary displays of PA can serve a protective function in the context of maternal Edys. Furthermore, this would help to address

the potential limitation of same-reporter bias in the two moderation models involving self-reported maternal Edys. Importantly, however, given that the conditional effects for high PA were largely convergent across the self-reported and physiological Edys moderation models, it seems that the pattern of findings is not simply due to same reporter bias.

In addition to increased longitudinal, multi-method assessments of the models tested in the present study, research would benefit from an investigation of the role of paternal Edys in child adjustment problems. Examining paternal Edys, particularly in tandem with maternal Edys, would further demonstrate how familial emotional difficulties are implicated in young children's adjustment problems. Applied research should also be conducted to find ways to promote both parental ER and child PA in order to facilitate adaptive child development and mitigate risk for psychopathology, particularly amongst disadvantaged youth.

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Table 3.1

Descriptive Statistics for Maternal Edys, Child PA, and Child Internalizing and Externalizing Problems

	M (SD)	Range
DERS Total	67.43 (21.07)	36-152
RSA Suppression	-0.47 (0.65)	-2.30-0.84
CBQ Smiling/Laughing	5.95 (0.77)	3.77-7.00
Child Internalizing Problems	8.31 (7.60)	0-50
Child Externalizing Problems	10.71 (1.49)	0-36

Table 3.2

Intercorrelations Among Maternal Edys, Child PA, and Child Internalizing and Externalizing Problems

Variable	1	2	3	4	5
1. Self-reported Maternal Edys	—	-0.083	-0.352**	0.433**	0.310**
2. Maternal Physiological Edys		—	0.012	0.027	-0.072
3. Child Smiling/Laughing			—	-0.378**	-0.164
4. Child Internalizing Problems				—	0.647**
5. Child Externalizing Problems					—

** $p < 0.01$. * $p < 0.05$.

Table 3.3

Conditional Effects of Maternal Physiological Edys on Child Internalizing and Externalizing Problems at High and Low Levels of Child PA

Outcome Variable	b (SE)	T	R^2	F	95% CI
Child Internalizing Problems			0.31	9.10	
-1 *SD* (Child PA)	5.88 (2.07)	2.84**			1.74, 10.01
+1 *SD* (Child PA)	-6.00 (2.26)	-2.65*			-10.52, -1.48
Child Externalizing Problems			0.18	4.55	
-1 *SD* (Child PA)	4.02 (2.14)	1.87			-0.27, 8.31
+1 *SD* (Child PA)	-6.64 (2.34)	-2.83**			-11.33, -1.95

** $p < 0.01$. * $p < 0.05$.

Table 3.4

Conditional Effects of Maternal Self-Reported Edys on Child Internalizing and Externalizing Problems at High and Low Levels of Child PA

Outcome Variable	b (SE)	t	R^2	F	95% CI
Child Internalizing Problems			0.28	11.74	
-1 *SD* (Child PA)	0.07 (.04)	1.69			-0.01, 0.16
+1 *SD* (Child PA)	0.19 (0.05)	4.00**			0.10, 0.29
Child Externalizing Problems			0.11	3.84	
-1 *SD* (Child PA)	0.08 (0.05)	1.52			-0.02, 0.18
+1 *SD* (Child PA)	0.16 (0.06)	2.75**			0.04, 0.28

Note. The conditional effect for child externalizing problems at high levels of child PA is significant but the overall interaction term is not. ** $p < 0.01$. * $p < 0.05$.

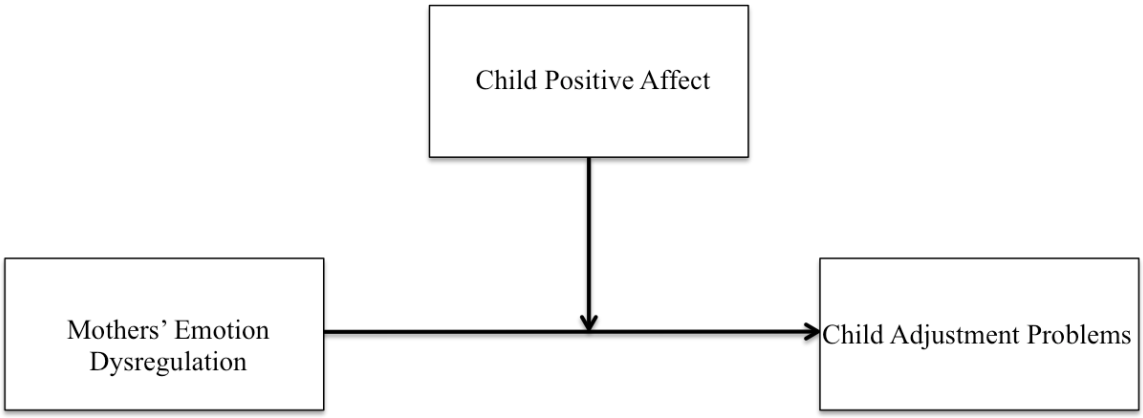

Figure 1.1. Diagram of the Proposed Associations Between Mothers' Emotion Dysregulation and Child Adjustment Problems

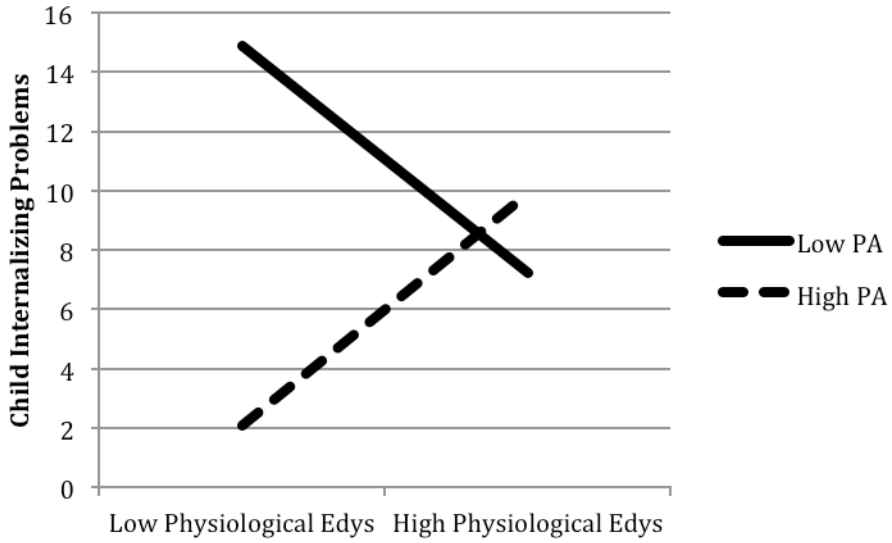

Figure 3.1. Children High in PA Whose Mothers are Low in Physiological Edys Show the Lowest Levels of Child Internalizing Problems

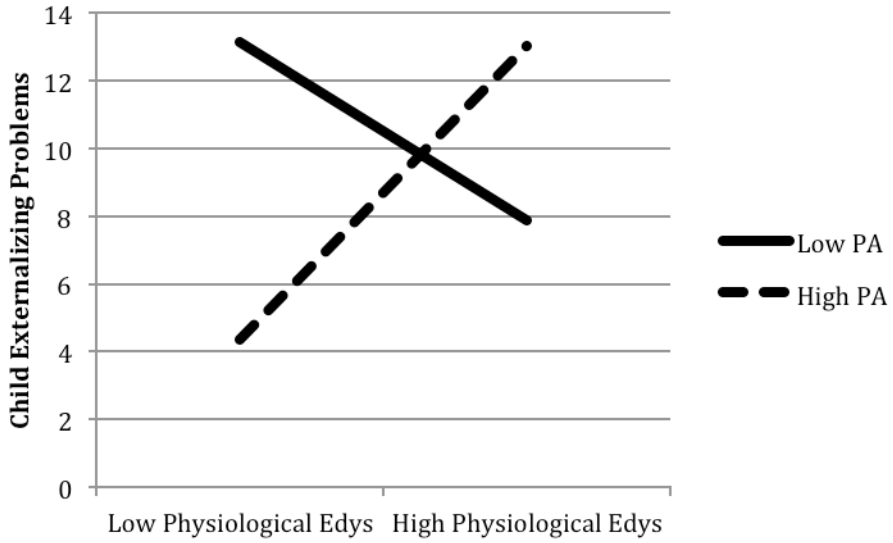

Figure 3.2. Children High in PA Whose Mothers are Low in Physiological Edys Show the Lowest Levels of Child Externalizing Problems

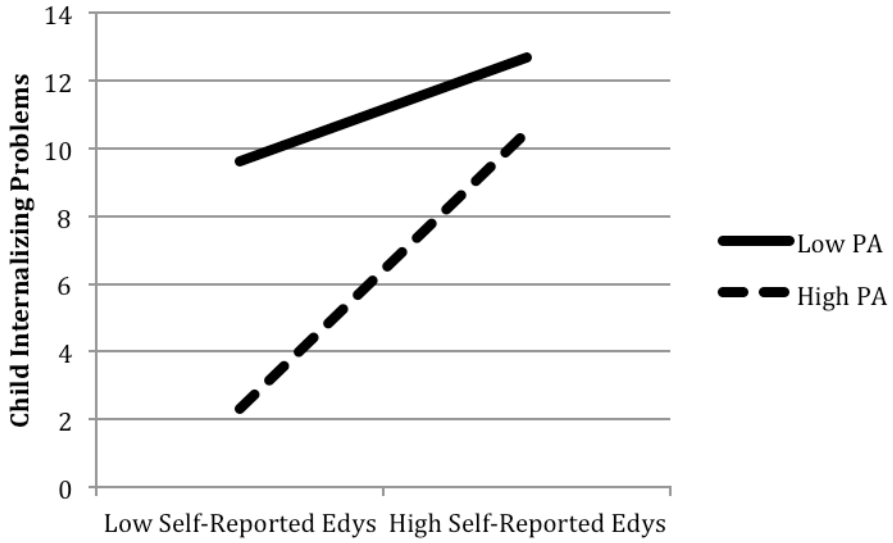

Figure 3.3. Children High in PA Whose Mothers are Low in Self-Reported Edys Show the Lowest Levels of Child Internalizing Problems