Maternal Emotion Dysregulation and its Association with Child Internalizing and Externalizing Behaviors and Heart Rate Variability

Jackie O'Brien[1], Jenn Lewis[1], & Yoel Everett[1]

[1] University of Oregon

Author Note

Correspondence concerning this article should be addressed to Jackie O'Brien, Postal address. E-mail: my@email.com

Abstract

Maternal emotion dysregulation, a transdiagnostic feature of psychopathology, may be a potential risk factor for the emergence of psychopathology in children. However, there is less known about child characteristics that might serve as protective factors against this risk. One such characteristic is heart rate variability (HRV) reactivity, where greater decreases in HRV from baseline to a stressor task indicate increased emotion regulation. This study examined whether increased child HRV reactivity served as a protective factor mitigating the transmission of psychopathology from emotionally dysregulated mothers to behavior problems in preschool age children.

Mother-preschooler dyads (N=66) were oversampled for maternal emotion dysregulation, measured using maternal self-report on the Difficulties in Emotion Regulation Scale. Mothers reported on child internalizing and externalizing behaviors using the Child Behavioral Checklist. Child baseline HRV was collected, where the child sat quietly for 2 minutes while a book was read to them. Child HRV was also measured during a stressor task, where dyads had 7 minutes to build a complex Lego figure. HRV reactivity was calculated by subtracting child baseline HRV from child HRV during the stressor task.

Two hierarchical regression models were conducted, entering maternal emotion dysregulation, child HRV reactivity, and the interaction term of these variables predicting either child internalizing or child externalizing problems (see Table 1). Across these two models, maternal emotion dysregulation, but not child HRV reactivity, significantly predicted child's internalizing and externalizing behaviors. Maternal emotion dysregulation significantly interacted with child HRV reactivity to predict child internalizing behaviors, such that maternal emotion dysregulation had a greater impact on child internalizing behaviors if the child exhibited a greater decrease in HRV from baseline to the stressor task (i.e. exhibited increased self-regulation). There was no significant interaction predicting child externalizing behaviors.

These findings suggest that maternal emotion dysregulation more strongly predicts child behavior problems in physiologically regulated children. Interventions that target maternal emotion dysregulation may therefore improve child behavior outcomes even in physiologically regulated children.

Keywords: emotion regulation, parenting, child outcomes

Word count: X

Maternal Emotion Dysregulation and its Association with Child Internalizing and Externalizing Behaviors and Heart Rate Variability

Introduction

Maternal emotion dysregulation, a transdiagnostic feature of psychopathology, may be a potential risk factor for the emergence of psychopathology in children. However, there is less known about child characteristics that might serve as protective factors against this risk. One such characteristic is heart rate variability (HRV) reactivity, where greater decreases in HRV from baseline to a stressor task indicate increased emotion regulation. This study examined whether increased child HRV reactivity served as a protective factor mitigating the transmission of psychopathology from emotionally dysregulated mothers to behavior problems in preschool age children.

Methods

Participants

Sixty-eight mothers and their preschool aged children (M = 48, SD = 7.6 months, 46% girls) were recruited from various sources including a developmental database maintained by the university psychology department, craigslist, and community mental health centers. Mothers were recruited based on the presence or absence of borderline personality disorder (BPD) symptoms, a disorder marked by extreme emotion dysregulation, as measured by the McLean screener (Zanarini et al., 2003). Mothers with elevated BPD symptoms were oversampled in order to ensure a range of emotion regulatory capabilities.

Procedure

Families participated in a 2.5-hour assessment in offices on a university campus. Prior to participation, both mother consent and child assent were obtained, per Institutional Review Board approval. While mothers completed questionnaires, children completed assessments in an adjacent room, although child assessment data is not presented here. Mother and children were then reunited for parent-child interaction tasks in which baseline and stressor task HRV was collected on both mothers and children. Only child HRV data is presented here.

Materials

Maternal emotion dysregulation. Maternal emotion dysregulation was measured using the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The DERS is a 36-item self-report questionnaire designed to assess multiple facets of emotional dysregulation, with scores ranging from 36-180. Higher scores suggest greater emotion dysregulation.

Heart rate variability. Child baseline HRV was collected, where the child sat quietly for 2 minutes while a book was read to them. Child HRV was also measured during a stressor task, where dyads had 7 minutes to build a complex Lego figure. HRV reactivity was calculated by subtracting child baseline HRV from child HRV during the stressor task.

Child behavior problems. Child behavior problems were assessed using maternal report on the Child Behavior Checklist (CBCL) for both internalizing (i.e., anxious, depressive, and overcontrolled) and externalizing (i.e., aggressive, hyperactive, noncompliant, and undercontrolled) behaviors.

Data analysis

We used R (Version 3.5.1; R Core Team, 2018) and the R-packages *bindrcpp* (Version 0.2.2; Müller, 2018), *dplyr* (Version 0.7.7; Wickham, François, Henry, & Müller, 2018), *forcats* (Version 0.3.0; Wickham, 2018a), *ggplot2* (Version 3.0.0; Wickham, 2016), *here* (Version 0.1; Müller, 2017), *jtools* (Version 1.1.1; Long, 2018), *kableExtra* (Version 0.9.0; Zhu, 2018), *knitr* (Version 1.20; Xie, 2015), *papaja* (Version 0.1.0.9842; Aust & Barth, 2018), *purrr* (Version 0.2.5; Henry & Wickham, 2018), *readr* (Version 1.1.1; Wickham, Hester, & Francois, 2017), *rio* (Version 0.5.10; C.-h. Chan, Chan, Leeper, & Becker, 2018), *stringr* (Version 1.3.1; Wickham, 2018b), *tibble* (Version 1.4.2; Müller & Wickham, 2018), *tidyr* (Version 0.8.1; Wickham & Henry, 2018), and *tidyverse* (Version 1.2.1; Wickham, 2017) for all our analyses.

Results

Two hierarchical regression models were conducted, entering maternal emotion dysregulation, child HRV reactivity, and the interaction term of these variables predicting either child internalizing or child externalizing problems (see Table 1). Across these two models, maternal emotion dysregulation, but not child HRV reactivity, significantly predicted child's internalizing and externalizing behaviors. Maternal emotion dysregulation significantly interacted with child HRV reactivity to predict child internalizing behaviors, such that maternal emotion dysregulation had a greater impact on child internalizing behaviors if the child exhibited a greater decrease in HRV from baseline to the stressor task (i.e. exhibited increased self-regulation). There was no significant interaction predicting child externalizing behaviors.

```
## Warning: Removed 4 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 4 rows containing missing values (geom_point).
```

```
## Warning: Removed 36 rows containing non-finite values (stat_smooth).
```

```
## Warning: Removed 36 rows containing missing values (geom_point).
```

Discussion

These findings suggest that maternal emotion dysregulation more strongly predicts child behavior problems in physiologically regulated children. Interventions that target maternal emotion dysregulation may therefore improve child behavior outcomes even in physiologically regulated children.

References

Aust, F., & Barth, M. (2018). *papaja: Create APA manuscripts with R Markdown*. Retrieved from https://github.com/crsh/papaja

Chan, C.-h., Chan, G. C., Leeper, T. J., & Becker, J. (2018). *Rio: A swiss-army knife for data file i/o*.

Henry, L., & Wickham, H. (2018). *Purrr: Functional programming tools*. Retrieved from https://CRAN.R-project.org/package=purrr

Long, J. A. (2018). *Jtools: Analysis and presentation of social scientific data*. Retrieved from https://cran.r-project.org/package=jtools

Müller, K. (2017). *Here: A simpler way to find your files*. Retrieved from https://CRAN.R-project.org/package=here

Müller, K. (2018). *Bindrcpp: An 'rcpp' interface to active bindings*. Retrieved from https://CRAN.R-project.org/package=bindrcpp

Müller, K., & Wickham, H. (2018). *Tibble: Simple data frames*. Retrieved from https://CRAN.R-project.org/package=tibble

R Core Team. (2018). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing. Retrieved from https://www.R-project.org/

Wickham, H. (2016). *Ggplot2: Elegant graphics for data analysis*. Springer-Verlag New York. Retrieved from http://ggplot2.org

Wickham, H. (2017). *Tidyverse: Easily install and load the 'tidyverse'*. Retrieved from https://CRAN.R-project.org/package=tidyverse

Wickham, H. (2018a). *Forcats: Tools for working with categorical variables (factors)*.

Retrieved from https://CRAN.R-project.org/package=forcats

Wickham, H. (2018b). *Stringr: Simple, consistent wrappers for common string operations*. Retrieved from https://CRAN.R-project.org/package=stringr

Wickham, H., & Henry, L. (2018). *Tidyr: Easily tidy data with 'spread()' and 'gather()' functions*. Retrieved from https://CRAN.R-project.org/package=tidyr

Wickham, H., François, R., Henry, L., & Müller, K. (2018). *Dplyr: A grammar of data manipulation*. Retrieved from https://CRAN.R-project.org/package=dplyr

Wickham, H., Hester, J., & Francois, R. (2017). *Readr: Read rectangular text data*. Retrieved from https://CRAN.R-project.org/package=readr

Xie, Y. (2015). *Dynamic documents with R and knitr* (2nd ed.). Boca Raton, Florida: Chapman; Hall/CRC. Retrieved from https://yihui.name/knitr/

Zhu, H. (2018). *KableExtra: Construct complex table with 'kable' and pipe syntax*. Retrieved from https://CRAN.R-project.org/package=kableExtra

Table 1

Means and SDs for Maternal Emotion Dysregulation (DERS) and Child Reactivity

DERS_mean	DERS_SD	Reactivity_mean	Reactivity_SD
70.10	22.33	-1.10	0.65

Table 2

Means and SDs for Child Internalizing and Externalizing Behavior

cbcl_subtype	cbcl_mean	cbcl_SD
ext	16.28	9.49
int	11.17	7.54

Table 3

Results of Linear Regression Predicting Child Internalizing Behavior

Predictor	*b*	95% CI	*t*(45)	*p*
Intercept	11.00	[9.04, 12.97]	11.27	$< .001$
Ders c	0.17	[0.08, 0.25]	3.98	$< .001$
Reactivity c	-1.19	[−4.30, 1.91]	-0.77	.443
Ders c × Reactivity c	-0.18	[−0.34, −0.02]	-2.27	.028

Table 4

Results of Linear Regression Predicting Child Externalizing Behavior

Predictor	*b*	95% CI	*t*(45)	*p*
Intercept	16.02	[13.34, 18.69]	12.06	$< .001$
Ders c	0.16	[0.05, 0.27]	2.84	.007
Reactivity c	1.72	[−2.50, 5.94]	0.82	.415
Ders c × Reactivity c	-0.03	[−0.25, 0.19]	-0.30	.764

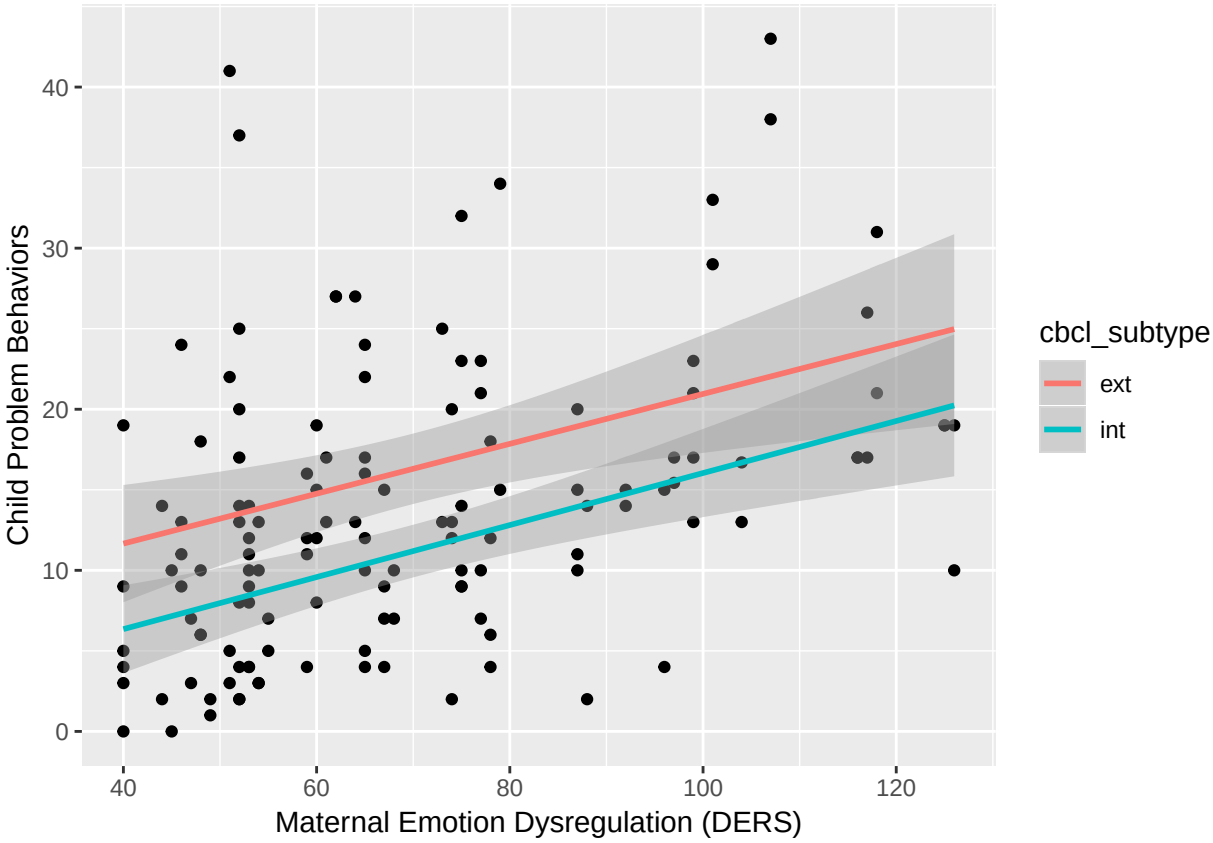

Figure 1. Maternal Emotion Dysregulation and Child Behaviors

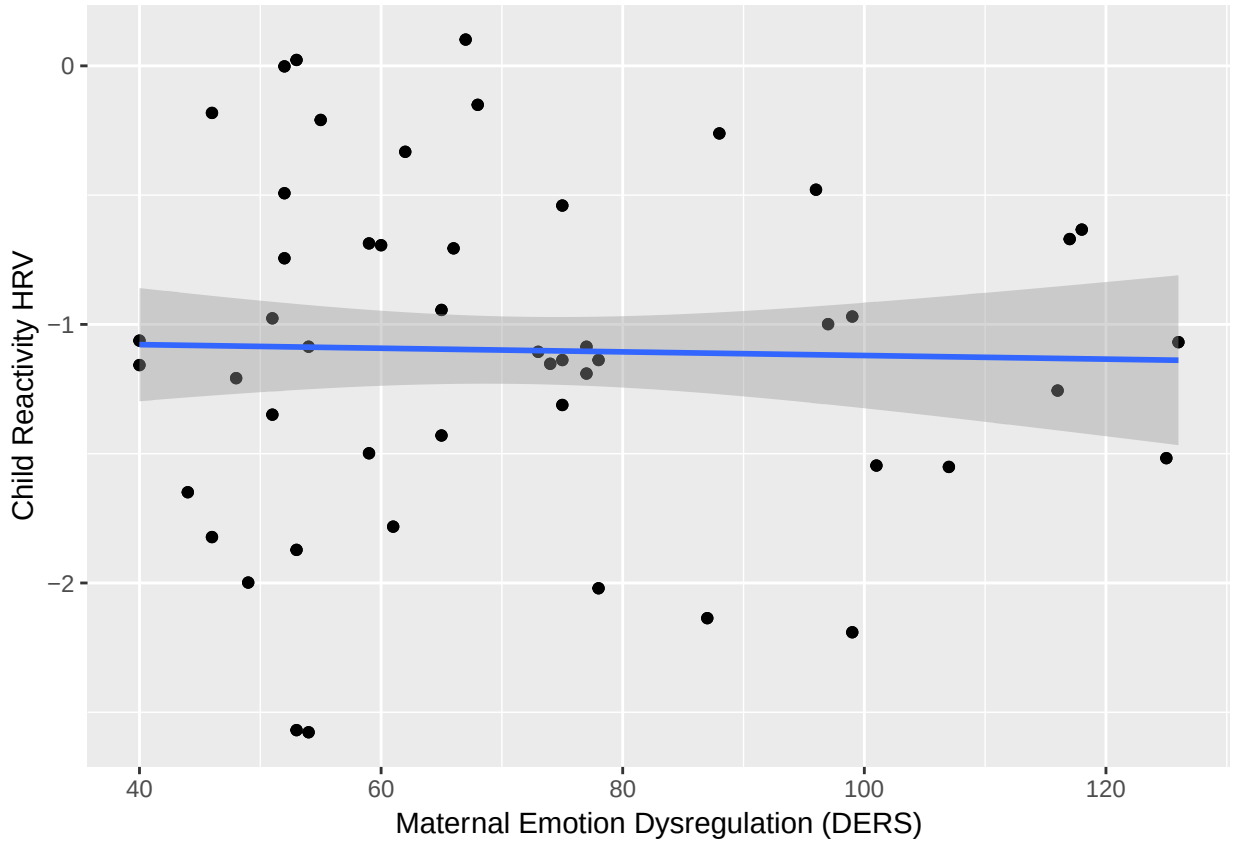

Figure 2. Maternal Emotion Dysregulation and Child HRV Reactivity

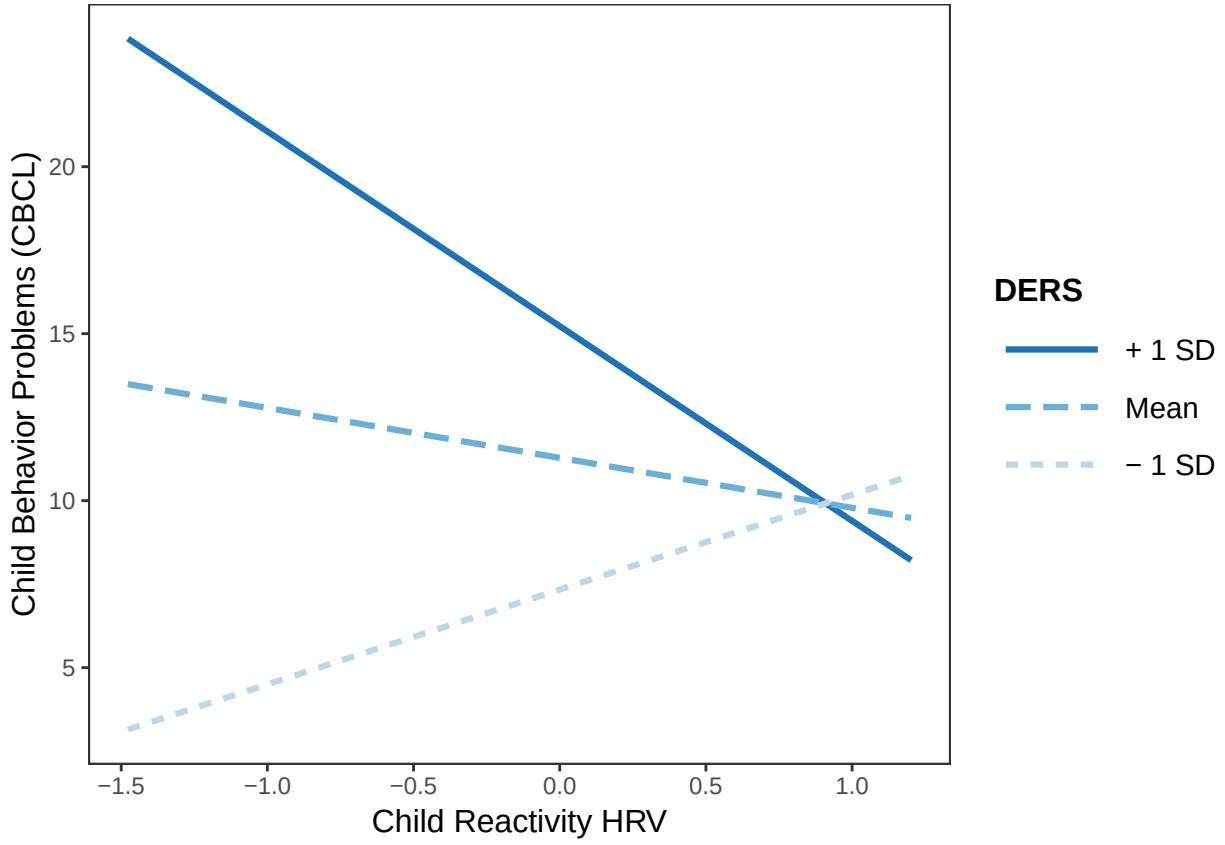

Figure 3. Child Reactivity Predicting Child Behavior Problems at Three Different Levels of Maternal Emotion Dysregulation