Correction to: Emotion Regulation via the Autonomic Nervous System in Children with Attention-Deficit/Hyperactivity Disorder (ADHD)

Erica D. Musser^{1,2,3} · Richard W. Backs³ · Colleen F. Schmitt² · Jennifer C. Ablow¹ · Jeffery R. Measelle¹ · Joel T. Nigg²

Published online: 26 January 2018

© Springer Science+Business Media, LLC, part of Springer Nature 2018

Correction to: J Abnorm Child Psychol (2011) 39:841–852
<https://doi.org/10.1007/s10802-011-9499-1>

This erratum reports an error in Musser, E. D., Backs, R. W., Schmitt, C. F., Ablow, J. C., Measelle, J. R., & Nigg, J. T. (2011). Emotion regulation via the autonomic nervous system in children with attention-deficit/hyperactivity disorder (ADHD). *Journal of Abnormal Child Psychology*, 39(6), 841–852. Errors in artifact removal for cardiac psychophysiology data were discovered and led to reporting of incorrect parameter values. This erratum reports updated means, standard deviations, and patterns of effects; determinations regarding significance and interpretations of results were unaffected. (The following abstract of the original article appeared in record <https://doi.org/10.1007/s10802-011-9499-1>). Despite growing interest in conceptualizing ADHD as involving disrupted emotion regulation, few studies have examined the physiological mechanisms related to emotion regulation in children with this disorder. This study examined parasympathetic and sympathetic nervous system reactivity via measures of respiratory sinus arrhythmia (RSA) and cardiac pre-ejection period (PEP) in children with ADHD ($n = 32$) and

typically developing controls ($n = 34$), using a novel emotion task with four conditions: negative induction, negative suppression, positive induction, and positive suppression of affect. Both groups showed strong task-response effects in RSA. However, typically developing children showed systematic variation in parasympathetic activity (RSA) depending on both emotion valence (more activation for negative emotion, reduced activation for positive emotion) and task demand (more activation for suppression than induction). In contrast, children with ADHD displayed a stable pattern of elevated parasympathetic activity (RSA) across all task conditions compared to baseline. No group differences in sympathetic activity (PEP) were observed. It is concluded ADHD in childhood is associated with abnormal parasympathetic mechanisms involved in emotion regulation.

Description of the Error and Updated Results

After publication, it was determined that there were errors in the identification and removal of artifacts in the cardiac psychophysiology data (i.e., the procedures described in the Methods were not consistently applied to all raw cardiac psychophysiology files). After carefully reviewing and reprocessing all the raw cardiac psychophysiology data utilizing the proper methods, as described in the original manuscript, it was ultimately determined that the significance decisions and conclusions reported in the original manuscript were unaffected. However, the specific means, standard deviations, parameter values, and effect sizes were adjusted. The corrected parameter values are reported in the accompanying corrected Tables and Figure. Specific information about additional changes to parameter- and p -values, as well as effect sizes are available by request to the author.

The online version of the original article can be found at <https://doi.org/10.1007/s10802-011-9499-1>

✉ Erica D. Musser
emusser@fiu.edu

¹ Psychology Department, University of Oregon, 1227 University of Oregon, Eugene, OR 97403, USA

² Psychology Department, Oregon Health & Science University, 3181 SW Sam Jackson Park, Road, Portland, OR 97239, USA

³ Psychology Department, Central Michigan University, 1200 North Franklin Street, Mount Pleasant, MI 48859, USA

Table 3 Respiratory sinus arrhythmia (RSA; ms²) and pre-ejection period (PEP; ms) in task epochs for ADHD and control groups

Variable (mean, SD)	ADHD (<i>n</i> = 32)	Control (<i>n</i> = 34)	<i>F</i> -value	<i>p</i> -value
Baseline physiology data				
Rest baseline				
RSA	7.55 (1.14)	7.31 (1.56)	0.70	.41
PEP	99.60 (8.90)	96.91 (12.52)	0.99	.32
Neutral baseline 1				
RSA	7.05 (1.33)	6.47 (1.45)	2.88	.09
PEP	97.73 (8.73)	96.22 (10.78)	0.39	.54
Neutral baseline 2				
RSA	6.87 (1.18)	6.70 (1.17)	0.32	.58
PEP	96.09 (9.99)	95.55 (11.56)	0.04	.84
Task physiology data				
Negative induction				
RSA	7.38 (1.07)	7.07 (1.17)	1.32	.26
PEP	98.31 (10.37)	94.45 (11.66)	2.00	.16
Negative suppression				
RSA	7.37 (0.99)	7.15 (1.11)	0.74	.39
PEP	98.15 (9.77)	95.41 (11.27)	1.11	.30
Positive induction				
RSA	7.36 (1.10)	6.48 (1.20)	9.57	<.01*
PEP	97.41 (9.51)	96.03 (11.50)	0.28	.60
Positive suppression				
RSA	7.31 (1.01)	6.90 (1.14)	2.34	.13
PEP	98.51 (10.80)	97.59 (13.00)	0.10	.76
Physiology change scores				
Negative induction				
RSA	0.34 (0.82)	0.60 (0.95)	1.44	.23
PEP	0.58 (7.33)	1.76 (6.21)	1.97	.17
Negative suppression				
RSA	0.32 (0.65)	0.70 (0.89)	4.16	.04*
PEP	0.43 (5.59)	−0.81 (6.54)	0.67	.42
Positive induction				
RSA	0.49 (0.65)	−0.22 (0.86)	14.26	<.01*
PEP	1.32 (7.61)	0.48 (5.39)	0.27	.60
Positive suppression				
RSA	0.44 (0.77)	0.20 (0.83)	1.47	.23
PEP	2.43 (6.06)	2.04 (11.15)	0.03	.86

*indicates significance at the *p* < 0.05 level

Fig. 1 Mean change scores in respiratory sinus arrhythmia (RSA) from baseline to each of the task epochs: negative induction (NI), negative suppression (NS), positive induction (PI), and positive suppression (PS) for ADHD and control groups