Applying the polyvagal theory to children's emotion regulation: Social context, socialization, and adjustment

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ABSTRACT

Effective emotion regulation is essential for children's positive development. Polyvagal theory provides a framework for understanding how parasympathetic regulation of cardiac activity contributes to children's adaptive versus maladaptive functioning. Maintenance of cardiac respiratory sinus arrhythmia (RSA) under social challenge should support emotion regulation and behavioral adjustment. Children's effective parasympathetic regulation and behavioral adjustment should be supported by appropriate parental socialization. These proposals were evaluated in a short-term longitudinal study of 94 preschool-aged children. Parenting and basal RSA were measured at home, then 6–10 months later behavioral adjustment and RSA in lab baseline and socially challenging contexts were measured. Children with relatively higher RSA in social challenge than at baseline ($\Delta$RSA) had fewer internalizing problems (IP) and externalizing problems (EP), and better behavioral self-regulation (SR). Mothers who used more negative control had children with lower $\Delta$RSA, more IP and EP, and less SR. Structural equation modeling showed that vagal regulation mediated associations between maternal negative control and children's adjustment; maternal negative control did not predict EP or SR after accounting for $\Delta$RSA. Associations were consistent across boys and girls, with one exception: Higher $\Delta$RSA was significantly associated with fewer EP in boys only. These findings suggest that the practical significance of physiological regulation might be best revealed in ecologically valid procedures, and that children's physiological mechanisms of emotion regulation are shaped by their experiences of parental socialization.

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1. Polyvagal theory and children's regulation and behavior problems

Basal RSA has been characterized as an index of individual differences in stable or typical levels of arousal associated with emotional reactivity, whereas dynamic changes in vagal
enervation in response to task demands are thought to connote active regulation of arousal to support effective coping (Beauchaine, 2001; Calkins, 1997; Porges, 1995). However, there have been inconsistencies across studies in the relations reported between basal or dynamic RSA and behavioral measures of children's ER. For example, three recent studies of the relations between children's externalizing problems (EP) and both their basal and reactive RSA produced contradictory results. In samples ranging from preschool-age to elementary school-age, both basal RSA and RSA change to challenge tasks were reported to be negatively, positively, or non-significantly related to children's EP (Beauchaine et al., 2007; Calkins et al., 2007; Dietrich et al., 2007). Similarly, across studies of the relations between RSA and children's internalizing problems (IP), some researchers have reported that children with more IP have lower basal RSA or weaker vagal suppression (e.g., El-Sheikh, 2001; El-Sheikh et al., 2001; Fox and Field, 1989), but many have failed to replicate these associations (e.g., Gerlach et al., 2003; Marshall and Stevenson-Hinde, 1998; Schmidt et al., 1999). Within our own research, neither baseline RSA (Hastings and De, 2008) nor RSA suppression to a cognitive challenge (Hastings et al., 2008) was associated with a variety of indices of preschoolers' IP, EP and self-regulation (SR). These disparate findings call into question whether the validity of polyvagal theory (Grossman and Taylor, 2007), or the efficacy of attempts to put polyvagal theory into practice.

Alternatively, there could be contexts in which a reduction in parasympathetic enervation of cardiac activity would support adaptive responding, and contexts in which vagal suppression would fail to do so (Porges, 2007). The myelinated vagus has been nicknamed the “vagal brake” because of its tonic impeding of the sinoatrial node, which is normatively set higher than typical resting heart rate (Porges, 2001). The vagal brake inhibits sympathetic arousal, induces a calmer state, and facilitates social engagement “when the environment is perceived as safe” (Porges, 2007, p. 120). Conversely, under conditions of threat, releasing the vagal brake allows the sympathetic–adrenergic tone and mothers’ self-reported responsive, negative and protective parenting were not concurrently associated at either time, and maternal parenting at 2 years did not predict children's vagal tone at 4 years. Overall, the existing literature has not yet provided consistent evidence that more appropriate parental socialization supports children's development of effective vagal regulation.

Several methodological issues might have limited past attempts to assess the relations between children's physiological regulation and parental socialization. Most researchers have only assessed children's basal or resting RSA, rather than dynamic vagal changes to stress or challenge, and it might be unreasonable to expect the normative range of parental socialization to override the genetic and epigenetic determinants of basal physiology. Those researchers who have examined vagal change typically have used the kinds of controlled laboratory tasks that, for the reasons considered previously, may not be effective for engaging the parasympathetic system in ways that are appropriate for revealing children's adaptive ER. Socialization has most often been assessed using only parental self-report measures, but parent reports of their own parenting might be of questionable validity, and multi-method assessments of parenting usually are considered superior (Janssens et al., 2005). Finally, few investigators have considered whether paternal socialization might contribute to children's vagal regulation.

3. Objectives and hypotheses

Dynamic indices of physiology measured in ecologically meaningful contexts are likely to be more robust indicators of individual differences in children's SR, EP and IP, compared to basal physiology. Similarly, dynamic vagal regulation might serve as
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