Recent efforts to understand the effect of early adversity (e.g. childhood maltreatment, harsh parenting, marital conflict) on development have begun to examine possible underlying psychological mechanisms that may be associated with patterns of psychopathology (e.g. El-Sheikh et al., 2008). Researchers use various methods to assess functioning of the two parts of the autonomic nervous system (ANS): the parasympathetic nervous system (PNS), which can be measured non-invasively by respiratory sinus arrhythmia (RSA); and the sympathetic nervous system (SNS), which can be measured non-invasively by skin conductance level (SCL). It is important to examine the joint patterns of PNS and SNS activity as patterns of co-inhibition and co-activation (i.e. non-reciprocal, non-normative) indicate dysregulation on the same organ systems (Bauer, Quas, & Boyce, 2002) possibly leading to emotional difficulties.

According to Biological Sensitivity to Context (BSC) theory, some people have biological and/or genetic predispositions towards high reactivity of biological stress response systems (i.e. SNS and PNS). Others may up-regulate their biological stress response systems over time in response to environmental demands, developing high reactivity. Subsequent to up-regulation, context-dependent environmental factors determine whether this high stress reactivity has a negative or protective effect (Boyle & Ellis, 2005a; Ellis & Boyle, 2008). Harsh parenting is one form of early adversity and is defined as the physical and/or psychological abuse of children by parents. Physical abuse includes a variety of physical parenting techniques and can vary in intensity from spanking or hitting a child to bashing or seducing a child deliberately (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998). The purpose of the present study was to examine the interactive effects of PNS activation (measured by RSA), SNS activation (measured by SCL), and harsh parenting experienced during childhood and adolescence on trait anxiety in a sample of young adults.

### MATERIALS AND METHODS

As part of a larger study examining family violence and measures of SNS and PNS activity, 162 young adults were recruited from the human subjects pool at the University at Albany. Subjects completed a modified version of the Conflict Tactics Scale Parent to Child (CTS-PC; Straus, Hamby, Finkelhor, Moore, & Runyan, 1998), the Trait Anxiety Scale (STAI; Spielberger et al., 1973), and resting levels of SCL and RSA were recorded. The CTS-PC is a 25-item self-report of parenting practices that yields five facets of parenting: positive parenting, psychological aggression, minor physical assault, severe physical assault, and very severe physical assault (Straus et al., 1998). We summed the three physical assault scales to get a total measure of harsh parenting. We asked subjects to report about harsh parenting during two time periods in their life, childhood and adolescence, using an anchor point for accurate recall.

The STAI is a widely used, 20-item self-report questionnaire designed to measure trait anxiety, or the generally stable components of anxiety (Spielberger et al., 1973). Due to considerable skewness, harsh parenting variables were square-root transformed; RSA was log-transformed and SCL was square-root transformed. All variables were re-centered prior to analysis. Regression analyses were conducted utilizing SPSS 17.0; suitable entered included trait anxiety; childhood total harsh parenting; SCL; RSA; and their interactions. Significant 3-way interactions were then probed using techniques outlined by Aiken and West (1991) and Dawson and Richter (2006).

### RESULTS

Results from this study indicate a gender-specific pattern of harsh parenting on trait anxiety in young adults. Among females, patterns of co-activation of the PNS and SNS (i.e. high RSA/high SCL) significantly moderated the relationship between childhood and adolescence harsh parenting, and trait anxiety. Patterns of co-inhibition (i.e. low RSA/low SCL), on the other hand, increased the relationship between adolescence harsh parenting and trait anxiety. For males, patterns of low RSA/high SCL (i.e. normative patterns) appeared to have a protective effect only in the presence of high childhood and adolescence harsh parenting and not in the presence of low levels of harsh parenting. These results can be understood in terms of BSC theory (i.e. Boyle & Ellis, 2005a; Ellis & Boyle, 2008) such that the presence of harsh parenting during childhood or adolescence in combination with high biological reactivity may increase risk of trait anxiety in young adults.

Regarding low biological reactivity (i.e. co-inhibition), the results suggest that adolescent harsh parenting may have a greater effect than childhood harsh parenting on trait anxiety in young adults. This is consistent with some studies (e.g. Grilo & Chechile, 1991; Taraborelli & Gormican, 1998; Waddington, 1966), which suggest that biological stress systems are more resistant to change over time; in the case of co-inhibition, perhaps biological stress systems are better able to recover from childhood harsh parenting than adolescence harsh parenting. Our findings of co-activation are consistent with work by (El-Sheikh et al., in press), which found that patterns of co-activation were associated with anxiety and depression in adolescents. Our results extend the work of (El-Sheikh et al., in press) suggesting that co-activation has a role in anxiety symptoms. The results of this study also lend evidence to Buhrs and colleagues (2002) notion that patterns of co-inhibition and co-activation may be more important when examining psychophysiological arousal.

This study has several limitations which include the sample size. We relied on retrospective recall of harsh parenting which may be subject to recall bias. This sample also represents a predominantly Caucasian, normative, college-aged population so the generalization to other ethnicities and clinical populations may be limited. Finally, we relied on an event-related measure to index SNS and a heart rate/vagal tone measure to index PNS, which is not exactly how Bernston and colleagues (1991) originally conceptualized co-activation and co-inhibition since they referred to the same organ systems dually innervated by SNS and PNS. Despite these limitations, this study contributes to the knowledge about moderators of the effect of harsh parenting on trait anxiety. The multi-system approach sheds light on how dual activity of the SNS and PNS may buffer or exacerbate harsh parenting. Understanding the joint activity of the SNS and PNS may be useful in future research and interventions for children subject to harsh parenting or other forms of environmental stressors. Indeed, BSC theory suggests that there may be possible differential treatment effects depending on a child's biological sensitivity/reactivity (Boyle & Ellis, 2005, Ellis & Boyle, 2008). Assessing biological mechanisms involved in anxiety states may also directly affect treatment and intervention strategies, particularly in the identification of specific deficits that may underlie certain disorders.

### FURTHER INFORMATION

Please contact arabkin@albany.edu. For further information on this and other projects, please visit our website located at http://www.albany.edu/cafeproject.