Adolescent Physiological Reactivity and the Caregiver:

Parenting Behaviors and Physiological Synchrony

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For my parents, from whose warmth and support I have benefited greatly.
Thank you for instilling in me an inquisitive mind and a passion for education.

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CHAPTER I

BACKGROUND

The prevalence of psychopathology in youth is high. Epidemiologic studies have shown

that up to 50% of children and adolescents meet criteria for a mental disorder at some point

during their development (Kessler et al., 2012; Merikangas et al., 2010). Further, many people

who experience a mental disorder in their lifetime report experiencing internalizing or

externalizing symptoms before the age of 14 (Kessler et al., 2005). Early onset of a psychiatric

disorder predicts greater impairment and worse disease course over time (Pettit, Lewinsohn,

Roberts, Seeley, & Monteith, 2009; Rohde, Lewinsohn, Klein, Seeley, & Gau, 2013; Zisook et

al., 2007). Thus, psychological problems and disorders frequently begin early in life, and both

environmental and individual risk factors play an important role in the development of

psychopathology. This dissertation examines the association between adolescent physiological

reactivity and caregiver/parent behaviors to understand (a) the association of parenting behaviors

with adolescent physiological reactivity to stress and adolescent internalizing and externalizing

symptoms, and (b) the synchrony of caregiver-adolescent dyads' physiological responses to

stress on a minute-to-minute basis.

In this first chapter, I provide a general overview of the association between child

physiological responses and caregiver characteristics. I introduce definitions of several key

constructs, including physiological reactivity, physiological synchrony, and parenting. Next, in

Chapter 2, I present Study 1, which examines the associations between child physiological

reactivity, parenting behaviors, and internalizing and externalizing symptoms in adolescents. In

addition, I test the interaction between the sympathetic and parasympathetic branches of the autonomic nervous system as predictors of internalizing and externalizing symptoms. In Chapter 3, I present Study 2, which examines the concept of parent-child synchrony and the minute-to-minute physiological synchrony of parents and youth during a stressful conflict task. Finally, in Chapter 4, I discuss the implications of these studies regarding the associations of caregiver behavior and child physiological reactivity and offer next steps for future research aimed to advance the understanding of how parents impact the development of their offspring.

One potentially important factor in the development of psychopathology is the ability to regulate physiological responses in emotional or stressful contexts (Wilson et al., 2016). Indeed, there is substantial evidence supporting the link between difficulties in physiological reactivity to stress and psychopathology in youth (Ellis & Boyce, 2008). Specifically, regulation of automatic physiological responses to stress during childhood and adolescence may buffer against negative developmental outcomes, while deficits or dysregulation in these processes have the potential to amplify risk (Obradovic, 2012). Disruptions in functioning of the stress response system have been proposed as a prominent mechanism in the etiology of psychopathology, and the autonomic nervous system (ANS) has been hypothesized as an important biological mechanism by which social experience during childhood relates to mental and physical health outcomes later in life (Ellis & Boyce, 2008; Miller, Chen, & Parker, 2011; Repetti, Taylor & Seeman, 2002). Evidence that youths' ANS functioning is affected by extreme and harsh caregiving, such as maltreatment and abuse (Bruce, Fisher, Pears, & Levine, 2009; Cicchetti & Rogosch, 2001), has paved the way for research examining the effects of parenting within a more typical range. Indeed, a burgeoning literature supports the role of a more normative caregiving environment on the development of healthy neurophysiologic functioning (Chaplin et al., 2014; Doan & Evans,

2011; Marceau, Dorn, & Susman, 2012). Closer examination of specific caregiver influences on the developing ANS are potentially important, as typical variation in childhood experiences can become "biologically embedded" and influence the course of child development (Nelson, 2013).

Several theoretical models postulate that attentive caregivers can protect children from the physiological impact of stressors (Shonkoff, 2010). Specifically, parental figures can aid in the regulation of the ANS (Meaney, 2001; Nachmias, Gunnar, Mangelsdorf, Parritz, & Buss, 1996; O'Donnell & Meaney, 2020). In addition, it has been reported that parents and infants show synchrony in parasympathetic and sympathetic physiology (Baker et al., 2015; Moore & Calkins, 2004), which is believed to support the child's developing stress regulation system (Champagne, 2008). However, less is known about how the stress response system is shaped by caregivers during childhood and adolescence (Creavy, Gatzke-Kopp, Zhang, Fishbein, & Kiser, 2020; Fagundes, Diamond, & Allen, 2012; Hostinar, Sullivan, & Gunnar, 2014; Hostinar, Johnson, & Gunnar, 2015).

Despite the importance of examining caregiver influences on children's ANS functioning, few studies directly examine this relation using rigorous study designs (Vreeland, 2019). Further, empirical evidence suggests that automatic physiological responses may be changeable (Cicchetti, Rogosch, Toth, & Sturge-Apple, 2011), making this system a crucial research target to inform intervention.

Overview: Physiological Reactivity in the Autonomic Nervous System

Altered physiological reactivity (e.g., heightened or blunted physiological arousal in response to stress) is associated with increased risk for internalizing and externalizing problems (Bauer, Quas, & Boyce, 2002; Beauchaine et al., 2013; Nock & Mendes, 2008). *Automatic*

responses to stress (i.e., either heightened or blunted reactivity) may reflect a biological predisposition for some youth to be more sensitive to stressful environments and is potentially "wired-in" from birth and reflected in individual differences in temperament (Ellis, Boyce, Belsky, Bakermans-Kranenburg, & van Ijzendoorn, 2011). Children and adolescents with heightened physiological reactivity are hypervigilant to stressors in the environment and may be more sensitive to the impact of caregiver characteristics. In contrast, children and adolescents with blunted physiological reactivity to stress may exhibit a general pattern of hypoarousal that is characteristic of youth with iterative exposure to harsh parenting (e.g., interpersonal violence; Busso, McLaughlin, & Sheridan, 2018). Thus, youth with altered reactivity to stress may have an increased risk of internalizing and externalizing problems in response to interpersonal stress (Obradovic, 2012).

The ANS maintains the body's homeostasis through the regulation of the heart, lungs, kidneys, and a multitude of other organs. The ANS is responsible for mediating physiological responses to stress during times of perceived stress or threat through dynamic interactions of the sympathetic (SNS) and parasympathetic (PNS) branches of the ANS. Importantly, the SNS and PNS are heavily dependent on environmental input early in life, and both parenting behaviors and parents' own reactivity may strengthen or compromise healthy PNS and SNS functioning in children and adolescents (Orbadovic, 2012).

The SNS serves to *mobilize* the body's "fight or flight" behavioral response by recruiting physiological resources to respond to external demands (e.g., increasing heart rate, blood pressure, skin conductance, and the flow of oxygenated hemoglobin throughout the body; Porges, 2007). Skin conductance level (SCL) refers to electrodermal activity generated by the activation of sweat glands that are stimulated exclusively by the SNS. Thus, SCL is an ideal

indicator of SNS system functioning that is distinct from PNS activity. Previous research examining SCL as an indicator of SNS response has assessed SNS activity by observing baseline SCL levels (SCL-B) and SCL reactivity to stress (i.e., changes from baseline to challenge conditions, SCL-R), and both assessments provide important information about an individual's sympathetic response system (El-Shiekh, Keiley, Erath, & Dyer, 2013). SCL-B represents an individual's trait or resting level SNS activity, with low SCL-B indicating low-arousal and high SCL-B suggesting hypervigilance in the absence of a threat or challenge. In contrast, SCL-R is conceptualized as a state-specific indicator of the activation of the SNS.

The PNS provides counter-regulation to the SNS processes and serves to *dampen* sympathetic activation and restore "rest and digest" functions, facilitating a return to homeostasis (Porges, 2007). Respiratory sinus arrhythmia (RSA) is a measure of cyclical change in interbeat intervals of the heart occurring at the frequency of breathing and is reflected by an increase in heart rate with inspiration and a decrease during expiration. Baseline RSA (RSA-B) has been reported as an indicator of an individual's trait characteristic or temperamental level of arousal or regulation (Patriquin, Lorenzi, Scarpa, & Bell, 2014). RSA reactivity to stress or challenge (RSA-R) is another commonly used measure of PNS functioning (Bornstein & Suess, 2000; Calkins, Graziano, & Keane, 2007). High levels of RSA-B and RSA-R are conceptualized as vagal *augmentation*, indicating an elevated PNS activation and dampening of SNS processes, while low levels or decreases in RSA are conceptualized as vagal *withdrawal,* an indicator of increased mobilization of physiological and attentional resources to engage a stress response via PNS inhibition (Bornstein & Suess, 2000; Porges, 2007). At rest, RSA represents an individual's flexibility to respond to changing environmental demands (Fortunato, Gatzke-Kopp, & Ram, 2013); thus, vagal withdrawal (low RSA-B) suggests a reduced capacity to enact effective

responses to stressful events and atypical PNS functioning, while vagal augmentation (high RSA-B) suggests a greater capacity for self-regulation (Beauchaine, 2001). In contrast, when experiencing stress, vagal withdrawal (more negative RSA-R) generally represents an adaptive response by decreasing PNS engagement and effective responding while vagal augmentation (more positive RSA-R) in response to stress may indicate a failure to activate physiological resources that promote optimal engagement with environmental demands (Porges, 2007).

Overview: Adolescent Physiological Reactivity

The ANS performs self-regulatory functions and is one of the earliest physiological systems to become functionally mature (Geva & Feldman, 2008; Paus et al., 2001). Early-developing impairments in the SNS and PNS regulatory response systems can lead to subsequent deficits in an individual's ability to learn and acquire new skills (Geva, Schreiber, Segal-Caspi, & Markus-Shiffman, 2014). Adolescent stress physiology has been linked to a number of negative outcomes including higher levels of behavior problems and poorer psychosocial functioning (Kushner, Barrios, Smith, & Dougherty, 2016). Dysregulated physiological reactivity has also been associated with emotion dysregulation, a feature of several mental health disorders (Aldao, Nolen-Hoeksema, & Schweizer, 2010). Thus, research examining the individual differences in adolescent ANS functioning is an important step that will help improve our ability to identify high-risk individuals early in development, as well as develop and refine targeted interventions to prevent or treat psychopathology.

The development of the physiological stress response system is influenced by environmental factors (Alexander et al., 2009). Specifically, research suggests that parents' behaviors and other characteristics may influence the development of biological aspects of

children's emotion regulation (e.g., through exposure to harsh parenting styles or through contagion of the parent's own levels of physiological reactivity; Calkins, Smith, Gill, & Johnson, 1998; Kupper et al., 2005). A recent meta-analytic review of parenting behaviors and child/adolescent PNS and SNS reactivity found mixed evidence for associations between parenting behaviors and child and adolescent physiological stress response patterns, with some studies documenting heightened physiological reactivity, others documenting blunted reactivity patterns, and still others finding no relation between parenting behaviors and ANS reactivity (Vreeland, 2019). Similarly, research to date provides somewhat mixed evidence of the association between parents' and their children's physiological reactivity (see Davis, West, Bilms, Morelen, & Suveg, 2018, for review).

Overview: Parenting Behaviors and Adolescent Physiological Reactivity

The benefits of warm, supportive and structured parenting in promoting the healthy development of children and adolescents are well documented (Chen, Brody, & Miller, 2017; Gray & Steinberg, 1999). In contrast, harsh, negative, critical or withdrawn and unavailable parenting is related to a range of emotional, behavioral, cognitive, health, and social difficulties (Leverton, 2003; Thompson, Hollis, & Richards, 2003). Parenting that constrains rather than promotes autonomy, invalidates rather than supports, and is characterized by anger and aggression rather than warmth, is related to both internalizing and externalizing symptoms and disorders (Kawabata, Alink, Tseng, van Ijzendoorn, & Crick, 2011; King, Vidourek, & Merjanos, 2016). Findings include both self-report and observational studies of parenting, which have found that characteristics of cold, unsupportive, and neglectful parenting are associated with a broad array of mental health risks, including anxiety, depression, oppositional and

delinquent behavior (Browne, Odeuyungbo, Thabane, Byrne, & Smart, 2010; Hoeve et al., 2009).

Families characterized by conflict, aggression, and harshness are associated with damaging outcomes for children and adolescents including both altered autonomic nervous system functioning and the development of increased levels of psychological disorders (Repetti et al., 2002; McEwen & McEwen, 2015). Thus, it is imperative to elucidate the processes that drive associations between parenting behaviors and child/adolescent physiological reactivity. However, studies have been mixed regarding the impact of parenting on child/adolescent physiological reactivity, and many studies have failed to isolate and examine the direct effects of the caregiving environment on physiological development and reactivity (Vreeland, 2019). More specifically, research has largely not examined specific parenting strategies that may help to better understand how parenting "gets under the skin" and influences the brain and physiological reactivity during childhood and adolescence (Fox, Levitt, & Nelson, 2010; McEwen, 2012). Thus, one goal of the current study is to integrate assessments of the sympathetic and parasympathetic nervous systems via measurement of RSA and SCL, both at baseline and in response to relevant interpersonal stress, in order to clarify patterns of physiological reactivity as related to specific parenting behaviors and internalizing and externalizing problems in adolescents.

Overview: Parents' Physiological Reactivity and Child/Adolescent Physiological Reactivity

The influence that parents have on child and adolescent physiological reactivity is affected not only by parenting practices but, in addition, is influenced by parents' own patterns of reactivity to stress. Research has examined the synchrony between parents' and their

children's physiological reactivity to stress, as it is believed to support the child's developing stress regulation systems (Champagne, 2008). For example, mothers and infants show positive concordance in heart rate increases, and mothers and preschoolers show dynamic positive concordance in RSA over time (Feldman, Magori-Cohen, Galili, Singer, & Louzoun, 2011; Lunkenheimer et al., 2015). We know less, however, about parent-adolescent synchrony or coregulation of ANS physiology during the later developmental years (see Creavy et al., 2020, for a recent example). This period is salient because it is critical for the onset of several internalizing and externalizing disorders (Kessler et al., 2003).

Research has provided multiple examples of biological synchrony between parents and their offspring early in development (e.g., accordance in arousal levels and social gaze; Feldman, 2007). Further, emotion contagion, or the transfer of affect from one individual to another, has been reported in many close relationships, including family members (Larson & Almeida, 1999). More specifically, maternal positivity and anger predicted increases of these respective feelings in teenage offspring (Matjasko & Feldman, 2005). Given that families are important in terms of regulating children's biological development, it is also expected that they contribute to youths' ongoing physiologic responding.

The Current Studies

The caregiver-adolescent relationship is one of the most salient contexts in which children's physiological reactivity and regulatory systems develop (Morris et al., 2007). Caregivers who demonstrate awareness and supportiveness to children's emotions have children who demonstrate less disrupted physiological reactivity (Fosco & Grych, 2013: Tarullo & Gunnar, 2006). Careful consideration to the association of caregiver physiological reactivity

processes and parenting behaviors with adolescent physiological reactivity can better inform future interventions that aim to improve the caregiving environment.

The two studies presented here focus specifically on adolescent physiological reactivity and were designed to examine parenting behaviors and parent physiological reactivity as correlates of adolescent physiological reactivity in a sample of youth 10-15 years old. Specifically, Study 1 assessed the associations between parenting behaviors, physiological reactivity, and internalizing and externalizing symptoms. Study 2 assessed synchrony in parent-adolescent physiological reactivity, along with the moderating effects of parenting behaviors, parent and adolescent psychological symptoms, and early life stress.

CHAPTER II

STUDY 1: PARENTING AND STRESS RESPONSE SYSTEM IN ADOLESCENTS

Introduction

Parenting is a complex, demanding, and critical environmental component of child development. Negative parenting behaviors are implicated in childhood physical illness, substance use, and internalizing and externalizing psychological disorders (e.g., Chen et al., 2017; Gray & Steinberg, 1999). Although parenting research has provided consensus regarding the importance of parenting behaviors on the development of children, consensus has not been formed with regard to the precise nature of the subtypes of parenting. Measurement of parenting has been primarily characterized by two approaches: questionnaires completed by parents, children, adolescents, or other informants; and direct observations of behavior (Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Schludermann & Schludermann, 1988). While questionnaires have strengths, it is generally accepted within the field that observational measures of parenting behaviors are superior in criterion and predictive validity (Morsbach & Prinz, 2006). More specifically, multi-method research on parenting has employed observational and experimental designs to examine parenting processes in the laboratory, including the use of observational measures that are coded by independent raters (e.g., Melby et al., 1998). Parenting characteristics measured with observational methods often include positive behaviors such as warmth, responsive listening, and child centeredness, and negative parenting behaviors such as hostility, intrusiveness, and withdrawn behavior (Lovejoy et al., 2000).

Observational coding systems differ in the behaviors and codes that are included within dimensions of parenting, which has made it challenging to aggregate relevant findings. In a recent review examining the association between parenting behaviors and youth physiological reactivity, over 54 different terms were identified that had been used to describe parenting behaviors (Vreeland, 2019). Some studies used terms based on broad domains such as *positive parenting, negative parenting,* or *parenting quality* (e.g., Blair et al., 2015; Kertes et al., 2009), whereas other used more specific terms such as *limit setting, scaffolding,* or *rejection* to describe specific parenting behaviors (Evans et al., 2013; Garstein, Seamon, Thompson, & Lengua, 2018). The heterogeneity within the measurement of parenting has led some researchers to examine parenting dichotomously (e.g., positive parenting vs. negative parenting). Notably, examining parenting in this manner ostensibly addresses the question of whether it is adaptive or maladaptive to have "high or low" positive parenting, with no consideration of the specific parenting strategies that are used. Further, strategies are frequently distinguished as positive versus negative on an a priori basis, which can result in circular tests of association between these behaviors and symptoms of psychopathology.

Researchers have highlighted common themes in models of parenting that evoke dimensions of warmth (parenting behaviors that show support, acceptance, and understanding) and structure (parenting behaviors undertaken to influence the child's behaviors) as salient processes by which parents aid their children's adaptive responses to stressful situations (e.g., Gaylord-Harden, Bai, So, & Tolan, 2018; Watson et al., 2014). Parenting characterized by low levels of warmth and high levels of hostility has been associated with increased levels of internalizing problems and externalizing problems (see McKee, Colletti, Rakow, Jones, & Forehand, 2008 for review).

A recent meta-analytic review of parenting and child/adolescent PNS and SNS reactivity found small associations between parenting behaviors and independent indices of youth physiological reactivity (Vreeland, 2019). However, a burgeoning literature suggests the importance of including both baseline and reactivity indices of the PNS and SNS patterns in order to best understand reciprocal associations between these two branches of the ANS. Measurement of the PNS and SNS together provides a more balanced, comprehensive assessment of how autonomic reactivity develops. When considering the PNS and SNS together, reciprocal SNS and PNS patterns (PNS withdrawal and SNS activation and, conversely, increased PNS activity and decreased SNS activity) are conceptualized as adaptive autonomic responses and may function as protective factors in the context of negative family environments as they reflect more normative and directional responses to stress at the physiological level, promoting homeostasis. Conversely, coactivation (i.e., both branches activate) and coinhibition (activity of the PNS and SNS decrease) may indicate a failure of the ANS branches to work in tandem and indicate maladaptive responses (El-Sheikh et al., 2009; Gordis, Feres, Olezeski, Rabkin, & Trickett 2009). Preliminary evidence suggests that the reciprocal activation of SNS and PNS systems in children (e.g., low SCL and high RSA; high SCL and low RSA) buffers against the negative impact of aspects of family stress (including negative parenting) on internalizing and externalizing problems while coactivation or coinhibition may compound negative effects of stress (El-Sheikh et al., 2009).

Preliminary evidence suggests that the examination of multiple ANS indices (e.g., SCL and RSA) may be important in understanding the relation between parenting behaviors and physiological reactivity as well as the link between parenting and child/adolescent psychosocial development. Thus, the current study integrates assessments of the sympathetic and

parasympathetic nervous systems via measurement of RSA and SCL, both at baseline and in response to relevant interpersonal stress, in order to clarify patterns of physiological reactivity that may be related to parenting behaviors and internalizing and externalizing problems in adolescents. Additionally, in order to assess whether youth demonstrate sensitivity to familial contexts, including different aspects of parenting, it is important to assess variability in exposure to both beneficial and harmful environments, rather than simply the presence versus absence of one or the other (Belsky & Pluess, 2013).

The current study (Study 1) focused on *engaged/warm parenting,* and *intrusive/harsh parenting* as two aspects of parenting for several reasons. First, previous studies of the link between parenting behavior and adolescent internalizing and externalizing problems hav identified these dimensions as significant predictors for internalizing and externalizing child behavior problems (e.g., Galambos, Barker, & Almeida, 2003; Gruhn et al., 2016). Second, adolescence is a key period of development when parents must navigate youths' increasing desire for autonomy (Daddis, 2011), and warmth and intrusiveness are likely to be of particular import for adolescent development. Third, these parenting behaviors can be targeted through interventions, increasing the clinical relevance of the proposed work (e.g., Chorpita et al., 2011; Forehand, Jones, & Parent, 2013). It is noteworthy that a wide range of caregivers play a parental role for children, including biological parents, step-parents, grandparents, and adoptive parents. For the purposes of this study, I will be using the terms parents and parenting to include all caregivers.

The Current Study

The current study utilized an observational paradigm, physiological measurement, and parent-report to assess links between parenting behaviors, biological (SNS and PNS) responses, and internalizing and externalizing problems in adolescents ages 10-15 to address three primary aims. The first aim of the current study (Aim 1) was to examine the relations of parenting behavior (engaged/warm parenting, and intrusive/harsh parenting) with physiological reactivity patterns in adolescents. With regard to physiological reactivity, it is understood that change in SNS and PNS function encompasses both the magnitude and valence of change (see Figure 1). I hypothesized that: (1a) Intrusive/harsh parenting would be significantly associated with adolescents' SNS activation, as indexed by high levels of SCL-B and SCL-R, and PNS activation, as indexed by decreased vagal tone (i.e., low RSA-B) and blunted RSA withdrawal (i.e., more positive RSA-R, higher RSA-R). (1b) Engaged/warm parenting would be significantly associated with adolescents' SNS activation, as indexed by low levels of SCL-B and SCL-R, and PNS activation, with high levels of RSA-B, and low levels of RSA-R (i.e., more negative RSA-R).

Aim 2 assessed independent associations of adolescent physiological reactivity and caregivers' parenting behaviors with current adolescent internalizing and externalizing symptoms. Specifically, it was hypothesized that: (2a) High baseline levels of SCL (i.e., high SCL-B), low baseline levels of RSA (i.e., low RSA-B), increased SCL reactivity (i.e., high SCL-R), and blunted RSA withdrawal (i.e., high RSA-R) patterns would be related to higher levels of internalizing and externalizing symptoms in youth. (2b) Reciprocal activation of the ANS during the conflict interaction task (i.e., high SCL-R with low RSA-R; low SCL-R with high RSA-R) in adolescents and engaged/warm parenting would be associated with lower levels of child internalizing and externalizing problems across all youth. (2c) In contrast, it was expected that

intrusive/harsh parenting, coactivation of the SNS and PNS during the conflict interaction task (i.e., high SCL-R with high RSA-R), and coinhibition (i.e., low SCL-R with low RSA-R) would be associated with higher levels of adolescent internalizing and externalizing problems. It is important to note that SCL and RSA at baseline were also examined in this study since research has shown that baseline levels of one branch may influence or interact with reactivity levels of another branch (El-Sheikh et al., 2009). Thus, consistent with findings reported by El-Sheikh (2009), it was also hypothesized that (2d) the role of SCL-R will vary depending on PNS functioning at baseline (i.e., RSA-B), whereas (2e) baseline SNS activity (i.e., SCL-B) was not expected to significantly interact with RSA-R.

Aim 3 of the current study assessed if the association between parenting behaviors and adolescent psychological symptoms is moderated by adolescent physiological responses to stress. It was hypothesized that: (3) Adolescent physiological reactivity will moderate relations between parenting behaviors and adolescent internalizing and externalizing symptoms. Specifically, reciprocal SNS and PNS patterns (i.e., high SCL-R with low RSA-R; low SCL-R with high RSA-R) were hypothesized to diminish the association between parenting and youth internalizing and externalizing problems. In contrast, coactivation (i.e., high RSA-R and high SCL-R) and coinhibition (i.e., low RSA-R and low SCL-R) were expected to amplify relations between parenting behaviors and youths' internalizing and externalizing symptoms (see Figure 2).

<center>Method</center>

Participants

Adolescents and their parents were recruited with the goal of obtaining a sample representing a continuum of exposure to adverse childhood experiences (ACES), including type, severity, and number of ACEs. Participants were excluded if they reported current or past psychosis, pervasive developmental disorder, or a pre-existing neurodevelopmental condition. Adolescents and their parent were eligible for study participation if the adolescent had resided in the home for at least six months prior to the assessment. This restriction was chosen to assess and control for the reliability of parent-reports on questionnaire measures and to increase the relevance of the parent-child discussion task.

Fifty-six adolescent-parent dyads were enrolled in the study. Adolescents were 10 to 15 years old ($M = 12.21$, $SD = 1.70$), 53.6% were female, and their parents ($M = 42.04$, $SD = 7.34$), 92.9% female. A majority of parents were biologically related to the adolescent (87.5%); including 46 biological mothers, 2 biological fathers, and one biological aunt/adoptive mother. Parents who were not biologically related to the adolescent included four adoptive mothers, one stepmother, one adoptive father, and one uncle. The sample was predominantly non-Hispanic or Latino (100% or parents and 98% of adolescents), 75% of parents and 67.9% of adolescents were White, 19.6% of parents and 23.2% of adolescents were Black or African-American, 3.6% of parents and 5.4% of adolescents were Asian; the remainder reported "Other" or mixed racial/ethnic background. Parents' level of education included 1.8% completed high school or equivalency exam, 21.8% attended some college, 30.9% college graduates, and 45.5% with a graduate education. The marital statuses of the parents were 67.9% married or cohabitating with someone and 32.1% single, divorced, separated, or widowed. Adolescent-caregiver dyads came from a range of annual household income levels: 3.6% earned under $15,000; 5.5% earned $15,000 - $29,999; 12.7% earned $30,000 - $44,999; 14.5% earned $45,00 - $59,999; 16.4%

earned $60,000 - $74,999; 9.1% earned $75,000 - $89,999; 10.9% earned $90,000 – 104,999; 5.5% earned $105,000 - $119,999; 1.8% earned $120,000 - $134,999; 7.3% earned $135,000 - $149,999; and 12.7% earned $150,000 or more. Demographic characteristics of the sample are presented in Table 1.

Recruitment for this sample was interrupted by closure of the research laboratory due to the COVID-19 pandemic. An additional 30 families had been recruited for the study and were scheduled for participation, but data collection was halted with these additional families due to the closure. Recruitment of families will resume upon the reopening of the research laboratory and final analyses with the full sample (estimated $N = 110$) will be conducted but these additional data are not available for the current analyses.

Procedure

Adolescents and their parents were invited to participate in a study designed to understand how families cope with stress. Participants were recruited through a variety of sources, including email to the Vanderbilt employee list serve, Research Match, The Vanderbilt Center of Excellence for Children in State Custody, Nashville Children's Alliance, and the Vanderbilt Child and Adolescent Psychiatry Outpatient Clinic. Interested parents were screened prior to study enrollment. If a family had more than one child in the age range, one child per family was invited to participate (based on the parent's preference or oldest child in the age range if parent had no preference). Prior to the lab visit, parents and children were asked to separately complete a battery of measures about psychopathology (see Measures below). Adolescents and their parent completed an informed assent and consent form, respectively.

During the lab visit, adolescent-parent dyads participated in a physiological assessment to measure skin conductance level (SCL) and respiratory sinus arrhythmia (RSA) during a family discussion task. Prior to the physiological assessment, parents and adolescents completed the Issues Checklist (IC; Prinz, Foster, Kent, & O'Leary, 1979), where a topic was chosen upon which the parent and adolescent disagreed the most. Physiological sensors were then placed on the adolescent and parent. Ten sensors were placed on each the parent and adolescent. The researcher explained the function of the equipment to reduce any anxiety, and dyads were together while the sensors were attached. Participants were given the option of placing the sensors themselves, if they preferred. Sensors were placed on the rib cage (bottom left and bottom right rib), right collarbone, chest center, base of throat, nape of neck, mid back, and two were placed on the non-dominant hand. After the sensors were placed, the parent-child dyads were given 3 minutes to acclimate, followed by a 3-minute baseline, during which participants were instructed to sit quietly and breathe normally. Parents and youth then engaged in a 3-minute speaking baseline, during which participants were instructed to count aloud from a list of numbers using a speaking tone/volume akin to what they use in conversation. Next, the discussion task was completed, during which parent-adolescent dyads were instructed to talk about the previously identified disagreement (10 minutes). After the discussion ended, a recovery period (3 minutes) was completed, followed by a final baseline (3 minutes). Families were compensated $100 ($50 for child, $50 for caregiver) for completion of the study visit.

Measures

Respiratory Sinus Arrhythmia. Two well-established indices of RSA were used as indicators of PNS activity (RSA-B and RSA-R). RSA data were collected and analyzed

following well-validated procedures (Hinnant et al., 2015). Cardiovascular data were collected using a Mindware MW100A Acquisition System (Mindware Technologies, Gahanna, OH, USA) connected to an electrocardiograph (ECG) activity amplifier module and disposable pediatric snap ECG electrodes. Respiration was derived from spectral analysis of thoracic impedance (Z_0; Ernst, Litvack, Lozano, Cacioppo, & Berntson, 1999). A trained team of graduate students reviewed the cardiovascular data and manually edited artefacts and missing or misplaced R-peaks. Data were scored in one minute intervals using Mindware analysis software (HRV version 3.2.7), and RSA was averaged across the counting baseline and the conflict task to create mean scores for each condition. Baseline RSA (RSA-B) was derived from the natural log of the high frequency power (0.12-0.40 Hz), a validated method used to isolate parasympathetic influence on cardiac activity (Bernston et al., 1997). RSA-B was obtained during a standard counting task where participants were asked to count out loud for 3 minutes. Counting baseline was used to assess effects on RSA of respiration changes linked to speaking during the conflict task. RSA reactivity (RSA-R) was computed as a within-participant difference (change) score of mean RSA during the conflict task (described in detail below) relative to RSA during the counting baseline period (RSA-B). Lower (i.e., more negative) RSA-R scores indicate greater vagal withdrawal, while higher RSA-R scores indicate greater vagal augmentation.

Skin Conductance Level. Skin conductance level (SCL) was used as an indicator of SNS activity and was collected using the same MindWare equipment and software described above. Two disposable silver/silver-chloride (Ag-AgCl) electrodes (1" x 1" foam, 0% chloride gel) were placed on the palm of the adolescent's non-dominant hand. Mindware's electrodermal activity analysis software was used to calculate SCL values. The unit of measurement is microSiemens or μS. Data were scored in one minute epochs. As with RSA, SCL was averaged across the

counting baseline and conflict task to create mean scores. An SCL reactivity score (SCL-R) was created by subtracting the baseline mean from the conflict task mean such that positive scores indicate increased SNS activity and negative scores signify decreased SNS activity.

Conflict Task. The conflict interaction task was a 10-minute videotaped interaction during which adolescent-parent dyads were asked to discuss a commonly occurring source of conflict and to find a solution. Conflict topics were chosen using the Issues Checklist (Prinz et al., 1979), a questionnaire measure assessing the frequency and intensity level of 44 common topics (e.g., "getting along with siblings," "cleaning up bedroom"). Parent and adolescent each separately rated the intensity level of each conversation on a 5-point Likert scale ranging from 1 (calm) to 5 (angry). Dyads were then be instructed to discuss the topic endorsed as most "emotionally charged" by both raters. Conflict tasks using a similar protocol have been used to examine the associations between somatization, parenting behavior, and adolescent physiological responses (Rousseau et al., 2014).

Parenting Behaviors. The Iowa Family Interaction Rating Scales (IFIRS; Melby et al., 1998), a global coding system, was used to code the 10-minute conflict interaction task between parent and adolescent. The IFIRS system is designed to measure behavioral and emotional characteristics of parent and adolescent individually as well as at a dyadic level. Each behavioral code is scored on a 9-point scale, ranging from 1 (*not at all characteristic*) to 9 (*mainly characteristic*). Coders are instructed to consider both the frequency and intensity of the behavior, as well as the contextual and affective nature of the behavior when coding the interactions. Each video was coded separately by two, independent coders who then meet to establish consensus on any discrepant codes (i.e., codes rated greater than one point apart). The mean agreement for codes was 84%.

Although the IFIRS coding system uses a wide range of emotional and behavioral codes, the current study focused on ten codes that were selected two assess two types of parenting - engaged/warm parenting, and intrusive/harsh parenting (see Appendix A). The composite codes selected were based on theory-driven and empirically supported association with adolescent internalizing and externalizing symptoms. Interrater reliability was calculated for each IFIRS code using the intraclass correlation coefficient (ICC); ICCs ranged from .51 to .86. The engaged/warm parenting composite ($\alpha = .86$) included child-centered (mean ICC = .82), listener responsiveness (mean ICC = .84), communication (mean ICC = .75), warmth (mean ICC = .86), positive mood (mean ICC = .85), and positive reinforcement (mean ICC = .51). The intrusive/harsh parenting composite ($\alpha = .74$) included lecture moralize (mean ICC = .82), intrusiveness (mean ICC = .82), hostility (mean ICC = .84), and guilty coercion (mean ICC = .78).

Internalizing and Externalizing Problems. The Child Behavior Checklist (CBCL) was given to the caregiver to assess adolescent internalizing and externalizing symptoms in adolescents over the past six months (Achenbach & Rescorla, 2001). The CBCL has demonstrated strong test-retest reliability, and criterion-related validity has been established (Achenbach & Rescorla, 2001).

Data Analytic Strategy

Preliminary Analyses. To examine whether the conflict task successfully elicited physiological responses, *t*-tests were conducted comparing RSA and SCL at counting baseline (RSA-B, SCL-B) to RSA and SCL during the conflict task (RSA-Conflict, SCL-Conflict).

Hypothesis Testing. Bivariate Pearson's correlations were used to address Aim 1 and examined associations among observed parenting behaviors (engaged/warm parenting and intrusive/harsh parenting), and adolescent physiological reactivity (SCL-B, SCL-R, RSA-B, RSA-R). Hypothesis 1 would be supported if intrusive/harsh parenting is positively associated with SCL-B, and SCL-R, indicating higher sympathetic activity at resting states and greater increase in sympathetic nervous system activity from resting to conflict discussion task, positively associated with RSA-R, indicating blunted vagal withdrawal (i.e., more positive RSA-R), and negatively associated with RSA-B indicating lower parasympathetic reactivity when at rest. In contrast, engaged/warm parenting would be negatively associated with SCL-B, and SCL-R, indicating higher sympathetic activity at resting states and a decrease in sympathetic nervous system activity from resting to conflict task, negatively associated with RSA-R, indicating a decrease in RSA from baseline to conflict task (i.e., greater RSA withdrawal), and positively associated with RSA-B, indicating higher parasympathetic activity when at rest.

Aim 2 was addressed via bivariate correlations and linear regression analyses. First, adolescent internalizing and externalizing symptoms were included in the bivariate correlations. A significant positive relation was expected to emerge between youth internalizing and externalizing symptoms and SCL-B, SCL-R, RSA-R (i.e., blunted RSA withdrawal), and intrusive/harsh parenting. In contrast, a significant negative score was expected to emerge between youth internalizing and externalizing symptoms, RSA-B, and engaged/warm parenting. Four regression equations were conducted with internalizing problems as the dependent variable and four regression equations were conducted with externalizing problems as the dependent variables as follows: (1) The first equation examined engaged/warm and intrusive/harsh parenting, mean baseline SCL (SCL-B), mean baseline RSA (RSA-B), and the two-way

interaction of SCL-B * RSA-B. (2) Equation two examined engaged/warm and intrusive/harsh

parenting, SCL reactivity (SCL-R), mean baseline RSA (RSA-B), and their two way interaction

(SCL-R* RSA-B). (3) The third equation examined parental warmth, behavioral control,

psychological control, mean SCL baseline (SCL-B), RSA reactivity (RSA-R), and their two-way

interaction (SCL-B * RSA-R). (4) The fourth equation examined parental warmth, behavioral

control, psychological control, SCL reactivity (SCL-R), RSA reactivity (RSA-R), and their two-

way interaction (SCL-R * RSA-R). Associations of additional demographic variables (e.g.,

adolescent age, adolescent gender, SES) with internalizing and externalizing symptoms were

examined in bivariate correlations and were not included in regression analyses due to

insignificant correlations (rs = -.10 to .22, all p's > .10. All predictors were centered, and

centered scores were multiplied to calculate interaction effects. All predictors will be entered

simultaneously.

Reciprocal patterns of autonomic activity were expected to reflect more normative and

organized, directional responses to stress at the physiological level and therefore protect against

internalizing and externalizing problems otherwise associated with a stressful caregiving

environment. Consistent with Beauchaine (2001) and Beauchaine et al. (2007), I hypothesized

that coinhibition (lower SCL-R in conjunction with lower RSA-R; low SCL-B with low RSA-B)

will be associated with greater internalizing and externalizing symptom. I also hypothesized that

coactivation (high SCL-R in conjunction with high RSA-R; and high SCL-B with high RSA-B)

reflects a maladaptive stress response, and therefore will also predict greater internalizing and

externalizing symptoms. In addition, I hypothesized that RSA-B would moderate the association

between SCL-R and internalizing and externalizing symptoms, while SCL-B would not

significantly moderate the association between RSA-R and adolescent internalizing and externalizing symptoms.

To test Aim 3, a second step, three-way interactions were included in the multiple regression models described above in order to test the hypothesis that youth physiological reactivity would moderate the association between parenting behaviors and youths' internalizing and externalizing symptoms. Two, three-way interactions were used (Engaged/Warm Parenting X SCL-R X RSA-R; Intrusive/Harsh Parenting X SCL-R X RSA-R). Parenting variables were standardized prior to the analysis and the calculation of interaction terms, which were calculated by multiplying parenting variables with standardized change scores for SCL and RSA (SCL-R, RSA-R). Separate models were run to examine each parenting dimension (warm/engaged parenting, intrusive/harsh parenting) as a predictor of each outcome (internalizing and externalizing symptoms), resulting in four separate regression models.

Results

Descriptive Statistics: Physiological Reactivity

Means and *SD*s for study variables are shown in Table 1. Age, gender, and SES were not included in the correlation table due to their nonsignificant relations with all study variables. Adolescent's RSA increased significantly from baseline to the conflict task, $t(51) = 6.24$, $p < .01$, suggesting that on average the conflict task elicited RSA augmentation. Further, adolescent's SCL significantly increased from baseline to the conflict task $t(51) = 3.70$, $p < .01$. Thus, the conflict discussion task led to increases in both RSA and SCL, suggesting that the interaction

task was associated with coactivation of the sympathetic and parasympathetic systems in adolescents.

Parenting and Adolescent Physiological Reactivity (Aim 1)

Bivariate correlation analyses were conducted in order to assess associations between parenting behaviors (engaged/warm parenting and intrusive/harsh parenting), and adolescent stress reactivity (SCL-B, SCL-R, RSA-B, RSA-R). Hypothesis 1a was not supported, as neither intrusive/harsh parenting nor engaged/warm parenting were significantly associated with RSA-B, SCL-B, RSA-R, or SCL-R. Of note, the correlation between engaged/warm parenting and SCL-B approached significance ($r = .24$, $p = .08$), suggesting that greater levels of engaged/warm parenting may be associated with higher SNS activity during baseline.

Internalizing and Externalizing Problems (Aim 2)

Associations between parenting behaviors, adolescent physiological reactivity, and internalizing and externalizing problems were examined via correlations in order to better understand the possible links between these risk pathways to psychosocial problems. Results are presented in Table 2. RSA-R was significantly positively correlated with externalizing problems ($r = .30$, $p < .05$), supporting the hypothesis that high parasympathetic reactivity (greater RSA augmentation during the conflict task) is associated with increased parent-reported externalizing problems in youth. No other physiological index was associated with internalizing or externalizing symptoms.

Regression analyses were conducted to analyze parenting behaviors, SCL, RSA, and the interaction between SCL and RSA as predictors of internalizing and externalizing problems in

order to better understand the integration of the parasympathetic and sympathetic nervous systems. First, models predicting internalizing symptoms are presented in Table 3. Of the four calculated models predicting internalizing symptoms, Model 2 (RSA-B, SCL-R) and Model 3 (RSA-R, SCL-R) were significant $F(5,45) = 2.83$, $R^2 = .15$, $p < .05$ and $F(5,45) = 1.68$, $R^2 = .06$, $p < .05$, respectively. A significant interaction effect of RSA-B and SCL-R emerged predicting internalizing symptoms ($\beta = -.35$, $p < .05$). Specifically, for adolescents with high RSA-B, there was no association between SCL-R and youth's internalizing symptoms ($\beta = -.16$, $p = .41$). However, for adolescents exhibiting low RSA-B, there was a significant association between SCL-R and internalizing symptoms ($\beta = .75$, $p < .05$), such that higher SCL-R was associated with more internalizing symptoms. A graph of the interaction effect is shown in Figure 3. Engaged/warm parenting also emerged as a significant predictor of internalizing symptoms in Models 2 ($\beta = -.35$ $p < .05$) and 3 ($\beta = -.37$, $p < .05$) and approached significance in the remaining two models (β's $= -.31$ and $-.35$, $p < .10$). Specifically, greater levels of engaged/warm parenting were associated with fewer internalizing symptoms. Similarly, intrusive/harsh parenting was a significant predictor of internalizing symptoms in all four models ($\beta = -.39$ to $-.42$, $p < .05$). Of note, the main effect for intrusive/harsh parenting was also negative indicating that greater levels of intrusive/harsh parenting were associated with fewer internalizing symptoms. While I hypothesized that greater engaged/warm parenting would be associated with few internalizing symptoms, the negative association between intrusive/harsh parenting and internalizing symptoms did not support my hypothesis and is inconsistent with a large body of research focused on parenting and child psychopathology (Lovejoy et al., 2000).

In an identical fashion to the corresponding analyses reported for internalizing symptoms, multiple regressions were conducted to examine predictors of adolescent's externalizing

symptoms. Models predicting externalizing symptoms are presented in Table 4. Of the four calculated models, only Model 3 (RSA-R, SCL-R) was significant $F(5,45) = 2.74$, $R^2 = .15$, $p < .05$. RSA-R emerged as a significant predictor of externalizing symptoms both in Model 3 ($\beta = .35$, $p < .05$) and Model 4 ($\beta = .33$, $p < .05$). Specifically, greater RSA-R (RSA augmentation) was associated with more externalizing symptoms; this finding supported my hypothesis.

Parenting Behaviors, Internalizing and Externalizing Problems (Aim 3)

To test the hypothesis that adolescent internalizing and externalizing problems were a function of parenting behavior in the context of adolescent physiological reactivity, I conducted four multiple regression analyses. In all models, the first step was identical to the Model 4 described above. Both parenting variables (e.g., engaged/warm parenting, intrusive/harsh parenting), SCL-R, and RSA-R were included, which accounted for a significant amount of the variance in externalizing problems $R^2 = .12$ $F(4, 46) = 2.74$, $p < .05$, but not internalizing problems $R^2 = .08$, $F(4, 46) = 2.01$, $p = .11$. In Step 1, RSA-R was the only significant predictor of externalizing problems ($\beta = .33$, $p < .05$), whereas engaged/warm parenting and harsh/intrusive parenting were the only significant predictors of internalizing problems ($\beta = -.39$ and $-.40$, $p < .05$, respectively). In Step 2, a three-way interaction of parenting behavior by reactivity was entered (e.g., Engaged/Warm Parenting X SCL-R X RSA-R; Intrusive/Harsh Parenting X SCL-R X RSA-R). There was no significant interaction effect for either internalizing or externalizing problems (β's = -.01 to .26, all p's > .10), and results are reported in Tables 3 and 4.

Discussion

The autonomic nervous system (ANS) plays an important role in one's ability to adapt to stressful contexts through its associations with social and emotional resources involved in interpersonal interactions (Beauchaine, 2001). Many argue that environmental factors, including the caregiving environment, influence the development of the ANS (e.g., Kupper et al., 2005). Despite research that supports the role of parents' influence on both adolescents' sympathetic (Bell & Belsky, 2008; Boyer & Nelson, 2015; Bubier, Drabick, & Breiner, 2009; Williams & Woodruff-Borden, 2015) and parasympathetic (Blandon, Calkins, Keane, & O'Brien 2008; Graham, 2016, Skowron et al., 2011; Sturge-Apple et al., 2012) functioning, few investigations incorporate indices of both sympathetic nervous system (SNS) and parasympathetic nervous system (PNS) activity. To my knowledge, this is the first study to examine observational measures of parenting behavior with real-time physiological measurements of both the SNS and PNS in order to better understand the role parents play in adolescent's physiological reactivity. Aims of the current study include examining associations between: (1) parenting behaviors, sympathetic and parasympathetic nervous system activity, and internalizing and externalizing symptoms, (2) interactions between PNS and SNS indices with internalizing and externalizing problems, and (3) interactions between parenting behaviors and ANS indices with internalizing and externalizing problems. Results and implications of each aim are further discussed below.

Preliminary analyses demonstrated a significant change in SNS and PNS measures from counting baseline to conflict task. This task was designed to elicit SNS activity (El-Sheikh, 2005); thus, the results confirm that the tasks were effective in yielding SNS response. The significant increase in RSA from counting baseline to conflict task is interesting, and suggests that, the PNS was not working in tandem with the SNS response to withdraw or release the "vagal break." In contrast, the results indicate that the conflict task elicited RSA augmentation;

RSA augmentation reflects the maintenance of internal equilibrium and support for engagement. Examined in isolation, adaptive RSA responses include both greater suppression (Porges, 2007) and greater augmentation (Hastings et al., 2008). Thus, questions remain regarding reciprocal SNS and PNS patterns. Additional analyses examined the interplay between sympathetic and parasympathetic activity.

To address Aim 1, associations between parenting behaviors (engaged/warm parenting and intrusive/harsh parenting), and adolescent physiological reactivity (SCL-B, SCL-R, RSA-B, RSA-R) were examined via bivariate correlation analyses in order to assess how parenting behaviors impact later physiological responses to social stress. Although I hypothesized that parenting behaviors would be related to adolescent sympathetic (SCL) and parasympathetic (RSA) reactivity, these hypotheses were not supported. However, this pattern is not completely surprising given the large number of null results reported in previous studies examining the effects of parenting behaviors and adolescent physiological reactivity. A recent meta-analysis examining the association between positive and negative parenting behaviors and youth physiological reactivity reported 1 significant effect out of 9; baseline sympathetic activity was significantly associated with positive parenting ($r = -.06$, $p < .01$; Vreeland, 2019). This meta-analysis concluded that the scarcity of significant findings was likely due to the diversity of both the measurement of parenting and physiological reactivity and the type of interaction task. The current study attempted to address this by assessing specific parenting behaviors (engaged/warm parenting, intrusive/harsh parenting) measured using an observational coding system during a stressful interaction task. Nonetheless, no correlational effects were significant, suggesting that incorporated indices of both SNS and PNS activity as predictors of psychological functioning is an important next step.

Prior research has shown that reciprocal SNS and PNS patterns (i.e., high SNS/low PNS; low SNS/high PNS) are conceptualized as adaptive automated responses, as they reflect more normative and directional responses to stress at the physiological level (El-Sheikh et al., 2009; Gordis et al., 2009). Thus, reciprocal patterns of ANS reactivity were hypothesized to be associated with fewer internalizing and externalizing problems in adolescents. Results from the current study partially supports this hypothesis. In regression equations examining predictors of adolescent internalizing and externalizing symptoms, only 1 of 8 interaction terms was significant. Consistent with my study hypothesis, RSA-B significantly moderated the association between SCL-R and internalizing symptoms. Specifically, for individuals with low levels of resting RSA (RSA-B), greater SCL-R was significantly associated with more internalizing symptoms, but this effect was not significant for individuals with high RSA-B. High vagal tone (high RSA-B) suggests a greater capacity for self-regulation, and is indicative of a relatively large difference in heart rate during inhalation as compared with exhalation (Beauchaine, 2001). Thus, the significant interaction suggests that high RSA-B serves as a protective factor in adolescents whose SNS is reactive to stressful events.

One main effect (RSA-R) also emerged as a significant predictor of externalizing symptoms in both correlational and regression analyses. RSA-R was positively associated with externalizing problems, indicating that greater RSA augmentation is related to more externalizing problems. Research examining the effects of RSA-R on psychosocial problems in adolescents is limited, yet previous studies have reported low RSA-R (i.e., RSA withdrawal) as a protective factor against developing externalizing problems (El-Sheikh, Harger, & Whitson, 2001; El-Sheikh & Whitson, 2006; Katz & Gottman, 1997). While our findings are consistent

with previous research, future studies should continue to employ longitudinal designs to better understand links between ANS activity and internalizing and externalizing problems in youth.

Parenting behavior in the current study was assessed as specific subtypes of parenting (i.e., engaged/warm, intrusive/harsh) rather than parenting style typologies (e.g., positive parenting, negative parenting). Consistent with previous literature (Lovejoy et al., 2000), engaged/warm parenting was associated with fewer internalizing symptoms in the regression models. Unexpectedly and contrary to my hypothesis, intrusive/harsh parenting was also associated with fewer internalizing symptoms in the regression models. The negative association between intrusive/harsh parenting and internalizing symptoms suggests that adolescents whose parents engage in more intrusive/harsh parenting behaviors display fewer internalizing symptoms.

Strengths and Limitations

The current study had several strengths, including the use of a multimethod approach including observational assessment of parenting behaviors, parent-report questionnaires, and a physiological measurement of reactivity in a sample of adolescents. In addition, despite the potential importance of interactions between sympathetic and parasympathetic systems, most studies examine a single physiological system to predict child outcomes (Creavy et al., 2020; Lunkenheimer et al., 2015, Woody et al., 2016). By including simultaneously measured indices of SNS and PNS functioning, this study was able to closely examine the ways in which the two branches of the ANS interact to predict child internalizing and externalizing problems, and to moderate the association between parenting behaviors and child psychological symptomatology. In addition, by examining all combinations of SCL and RSA at baseline and in response to a

conflict interaction task, this study was able to provide a more comprehensive test of whether ANS activity patterns moderate the association between parenting behaviors and child internalizing and externalizing symptoms. However, it is important to address the limitations of this study in future research. Most notably, recruitment was halted due to the COVID-19 pandemic; thus, the reduced sample size resulted in relatively low statistical power to detect effects, particularly in regression models that include interaction effects. This study is ongoing, and additional participants will be recruited in order to increase power to detect effects. In addition, the effects of parenting behaviors on adolescent physiological reactivity may be more nuanced than examining means of these factors across a 10-minute task. Future research should continue to assess the association between parent factors and adolescent physiological reactivity, potentially examining their effects on a moment-to-moment scale.

Conclusion

Although correlational effects of parenting behaviors and adolescent physiological reactivity were not significant, in regression models both parenting behaviors and indices of physiological reactivity were predictors of internalizing and externalizing symptoms. RSA-R was a significant predictor of externalizing symptoms of 2 of the 4 models, indicating that greater parasympathetic augmentation in a stress is associated with more externalizing symptoms. In addition, both intrusive/harsh parenting and engaged/warm parenting were significant predictors of internalizing symptoms. While engaged/warm parenting expectedly predicted fewer internalizing symptoms; intrusive/harsh parenting also predicted fewer internalizing symptoms, which was contradictory to the study hypothesis. Finally, RSA-B was a significant moderator of the association between SCL-R and internalizing symptoms in

adolescents, providing additional evidence that high RSA-B serves as a protective factor in adolescents who have a more reactive sympathetic system (SCL-R).

CHAPTER III

STUDY 2: PARENT-CHILD PHYSIOLOIGCAL SYNCHRONY

Introduction

The last decade has witnessed a shift in parenting research such that the field has become increasingly interested in a biopsychosocial perspective that encompasses not only the behavioral but also the physiological dimensions of parent-child dyads (Davis et al., 2018). Furthermore, research has increasingly recognized the central role of automatic stress reactivity processes in relation to the development of emotional and behavioral problems in adolescence (Compas et al., 2017), and in the context of family functioning and parent-child interactions (e.g., Morris, Silk, Steinberg, Myers, & Robinson, 2007). For example, the ability to efficiently and effectively regulate one's negative emotional reactions during a conflict as a result of automatic processes may be vital in de-escalating conflict and facilitating an effective resolution (e.g., Bridgett, Burt, Edwards, & Deater-Deckard, 2015).

Such automatic emotion regulatory processes are complex and involve underlying neurobiological processes. In particular, a substantial body of work has linked the autonomic nervous system (ANS), to the capacity to regulate neurophysiological substrates for adaptive social, emotional, and communication behaviors (Porges, 2009). Of note, much research examining physiological processes has focused on static, rather than dynamic indices; however, physiological processes fluctuate moment-to-moment, particularly in the context of family interactions (Swain, Lorberbaum, Kose, & Strathearn, 2007).

Beginning in infancy, parent-child interactions become temporally linked through a process referred to as psychobiological attunement (Field, 1985), temporal interpersonal emotion systems (TIES; Butler, 2011), or biobehavioral synchrony (Feldman, 2007). Challenging parent-youth interactions may influence physiological arousal as a member of the dyad becomes stressed or aroused by the emotions or behavior of the other. Indeed, disruptions in this coordinated interpersonal physiological process may represent one mechanism underlying the development of psychopathology in youth. Furthermore, the joint examination of parent-adolescent physiological systems aligns with a developmental psychopathology framework examining the construct of physiological synchrony – the matching of biological states that are dynamically exchanged or coordinated between parent and child during social contact (Feldman, 2012). From an evolutionary perspective, physiological synchrony is a neurobioloigcal marker of the attachment system between parent and child (Feldman, 2017), and thus is critical to better understanding the impact of parents on the development of children and adolescents.

Physiological synchrony during a social interaction includes reciprocal and coordinated physiological activity between members of a dyad (Feldman, Magori-Cohen, Galili, Singer, & Louzoun, 2011). Parent-adolescent physiological synchrony provides adolescents the opportunity to match their biological rhythm and physiological states with parents in a coordinated manner. This synchrony facilitates shared timing and coregulation among parents and adolescents, which in turn, facilitates the development of socioemotional competence including attachment, social bonding, and emotion regulation (Feldman, 2007). However, physiological synchrony is not inherently adaptive or maladaptive, but rather the implications of parent-adolescent synchrony for adolescent's socioemotional development may be a function of a variety of other factors (e.g., parent's emotional traits, task characteristics). The adaptiveness of physiological synchrony

has been shown to vary as a function of the emotional context in which synchrony emerges (Creavy et al., 2020). For example, in the context of positive emotions, physiological synchrony can facilitate a joint emotional experience that promotes empathy and bonding. However, in the context of negative emotions, a synchronous matching of physiological reactivity may produce a matching of distress. Rather, it may be adaptive for one partner to contribute to the other's regulatory ability by co-regulating (e.g., increased arousal in one partner is contrasted by decreased arousal in the other).

Parent-adolescent conflict serves as an important context for adolescent development as youth begin to re-negotiate rules for greater independence within and from the family. Notably, the reciprocal, coordinated physiological exchange between parents and adolescents has been conceptualized as an indicator of a dyadic relationship that may shape adolescent adjustment (e.g., Woody et al., 2016). As the primary driver of the neurobiological stress responses, synchrony within the autonomic nervous system (ANS) including the sympathetic (SNS) and parasympathetic (PNS) nervous systems, has increasingly gained research attention. Given the relatively rapid responses of the PNS and SNS, modeling the up- and down-regulation of these two physiological systems provides a unique opportunity to examine real-time physiological dynamics within a relatively short time window (e.g., minute-to-minute).

A number of data analytic approaches and biological systems have been utilized to examine parent-child physiological synchrony. In a recent review, multilevel modeling (MLM) was identified as the most frequently used data analytic approach for examining parent-child physiological synchrony (Davis et al., 2018). MLM is well-suited for the examination of physiological synchrony as it can take into account the dyadic structure of the data and allows for the examination of dynamic changes in parents' and children's physiology over time. Although

utilized less frequently, correlational methods have also been employed to produce an estimation of parent-child physiological synchrony (Creavy et al., 2020). Respiratory sinus arrhythmia (RSA) and skin conductance level (SCL) have regularly been used as a synchrony measure of PNS and SNS arousal, respectively (Fowles, 2008; Porges 1986).

Research has also sought to illuminate potential sources of variability in physiological synchrony between family members. Previous work within the realm of physiological synchrony has demonstrated the utility of a within-person approach to examine the influence of parent characteristics (e.g., maternal history of major depressive disorder, Woody et al., 2016), child characteristics (e.g., early life stress, Giuliano, Skowron, & Berkman, 2015), and social context (Lunkenheimer, Tiberio, Skoranski, Buss, & Cole, 2017) on parent-child synchrony. Emerging research findings are complex, such that research indicates contextual risk can lead to stronger physiological synchrony (e.g., Merwin, Smith, Kushner, Lemay, & Dougherty, 2017), a disruption of physiological synchrony (e.g., Lunkenheimer et al., 2015; Woody et al., 2016) or no differences in physiological synchrony (e.g., Pratt et al., 2017; Williams et al., 2013). Research on parent-child physiological synchrony in the context of risk has focused on parent and/or child psychopathology, parenting behaviors, and child maltreatment. Thus, better understanding the role contextual risk has on physiological synchrony is an important next step.

The majority of the work on physiological synchrony has focused on infancy (Feldman, 2017) as well as on a singular physiological system (e.g., heart rate: Creaven, Skowron, Hughes, Howard, & Loken, 2014; cortisol, Hibel Granger, Blair, Finegood, The Family Life Project Key Investigators, 2015; respiratory sinus arrhythmia, Woody et al., 2016). Of import, the impact of parents on youth is critical throughout development and physiological synchrony extends beyond infancy (Davis et al., 2018; Thomassin & Suveg, 2014). A recent study examined physiological

synchrony in young adolescents and their parents and reported that negative synchrony (i.e., increases in one partner correspond to decreases in the other) while viewing a film with negative emotional content was correlated with higher adolescent-reported empathy (Creavy et al., 2020). This effect was moderated by caretaker's emotional acceptance. Achieving a state of dyadic synchrony, including positive synchrony (i.e., increases in one partner correspond to increases in the other), negative synchrony (i.e., significant correspondence between partners but in opposite directions), and nonsynchrony (i.e., no correspondence in partners' physiology), may be a mechanism by which emotion regulation transpires. Thus, examining the extent to which dyads achieve synchronous states, as well as considering the impact of contextual factors (i.e., individual, relational, family), on the magnitude and/or direction of parent-adolescent physiological synchrony is critical as it allows for a more nuanced understanding of physiological synchrony. Finally, examination of multiple physiological systems (PNS, SNS) extends the literature by integrating the two branches of the ANS. Thus, examining both PNS and SNS physiological synchrony in later developmental periods (e.g., adolescence) is a critical next step.

The Current Study

The current study aims to build upon Study 1 by examining *dynamic* parenting influences on adolescent physiological reactivity. The primary aim of the study was to examine synchrony of parent and adolescent physiological responses during a conflict interaction task by collecting continuous measures of RSA and SCL. For example, parents' RSA during minute 2 would be associated with adolescent RSA during minute 2, after controlling for levels of adolescent physiological reactivity during minute 1, and vice versa. It was expected that parent

physiological reactivity would be associated with concurrent adolescent physiological reactivity as measured by respiratory sinus arrythmia (RSA) and skin conductance level (SCL).

In addition, research to date provides somewhat mixed evidence regarding the effect of contextual factors on parent-adolescent synchrony. The current study also aims to determine if contextual factors (e.g., parenting behaviors, parent and child psychopathology, child maltreatment) moderate the level of physiological synchrony exhibited. I hypothesized that parent-child dyads characterized by engaged/warm parenting would exhibit positive synchrony (i.e., high concordance among average and dynamic parent-child RSA/SCL) during the conflict discussion. In contrast, I hypothesized that dyads with a parent exhibiting high levels of intrusive/harsh parenting, a parent endorsing current depression symptoms, an adolescent with history of child maltreatment, or an adolescent endorsing high levels of internalizing and externalizing symptoms would display reduced or negative physiological synchrony (i.e., low concordance or even discordance among average and dynamic parent-child RSA/SCL) during the conflict discussion task.

Method

Participants and Procedure

Study 2 used the same sample of parent-adolescent dyads and procedure reported in Study 1.

Measures

Parental depression. The Patient Health Questionnaire (PHQ; Spitzer, Kroenke, &

Williams, 1999) is self-report measure of mental health disorders. The current analyses examined

one of the six PHQ modules: depression (9 items). Responses on the depression module was

summed to yield a severity rating, with established cutoffs indicating mild, moderate, moderately

severe, and severe symptoms levels. The depression module has been utilized in samples of

parents to document rates of mental health disorders (Gilbody, Richards, Brealey, & Hewitt,

2007) and identify those in need of mental health treatment (Gjerdingen, Crow, McGovern,

Miner, & Center, 2009). The reliability and validity of the PHQ have been demonstrated in a

variety of large samples (Spitzer et al., 1999). Internal consistencies for the current sample were

$\alpha = .848$.

Respiratory sinus arrythmia. RSA data was processed using Mindware's HRV (v. 3.2.7)

software. Trained graduate students inspected cardiac waves and corrected any misidentified R

peaks. In the event that the automated peak detection algorithm failed to locate the correct point

of the R peak, the graduate student would manually identify the R peak from the wave-form. If

noise corrupted the waveform such than an R peak could not be reliably discerned, the location

was estimated as the midpoint of the adjacent beats. If noise corrupted the integrity of the

waveform for multiple successive beats, 30 seconds of contiguous R peak data was not available,

or graduate students had to estimate more than 10% of R peaks then the data were deemed

unusable for that segment. In RSA analyses, for 38 dyads, usable data were available for the full

duration of the conflict task. Four dyads were determined to have unusable data for the full

duration of the task for either parent ($n = 1$), child ($n = 2$), or both ($n = 1$). For the remaining 14

dyads, data was missing for a portion of the conflict task, ranging from 2 to 9 usable epochs

within the 10-minute conflict task. In instances where an individual's RSA estimates

corresponded to unusable portions in their partner's data, the corresponding data points were removed to ensure that both series had an equal number of data points, which were accurately aligned in time.

Skin Conductance Level. SCL data was processed using Mindware's Electrodermal Activity (EDA, v. 3.2.7). Trained graduate students inspected the SCL data and identified any outliers that signaled a break in data acquisition (e.g., detached electrode). In SCL analyses, for 50 dyads, usable data were available for the full duration of the conflict task for both participants. For the remaining 6 dyads, data were determined to be unusable for the full duration of the task for either the parent ($n = 3$), child ($n = 2$), or both ($n = 1$). In instances where an individual's SCL estimates corresponded to unusable portions in their partner's data, the corresponding data points were removed to ensure that both series had an equal number of data points, which were accurately aligned in time.

Early Life Adversity. Early life adversity was assessed via the Child Trauma Questionnaire (CTQ; Bernstein & Fink, 1998). The CTQ is a 28-item self-report inventory with five subscales: emotional abuse (EA), physical abuse (PA), sexual abuse (SA), emotional neglect (EN), and physical neglect (PN). Each subscale is composed of 5 items and uses a five-point Likert scale (1 = *never true*, 2 = *rarely true*, 3 = *sometimes true*, 4 = *often true*, 5 = *very often true.* Two items from the PN subscale and five items from the EN subscale are reverse-coded. Previous studies support the reliability and validity of the CTQ (Spinhoven et al., 2014). Internal reliabilities in this sample (α) were as follows: EA = .906; PA = .869; SA = .980; EN = .827; and PN = .722.

Data Analytic Strategy

Preliminary Analyses. Parent and adolescent RSA and SCL data were collected simultaneously and longitudinally nested within dyads. Across 56 parent-adolescent dyads comprising 112 individuals, RSA data were collected for a total of 538 epochs for parents and 503 epochs for adolescents, and SCL data were collected from 520 epochs of parents and 530 epochs of adolescents. All analyses were conducted with SPSS 26 (IBM Corp. 2019) to model dynamic physiological concurrent associations between parent and child RSA and SCL over the course of the 10-minute discussion task. As a preliminary step in examining synchrony of parent-child dyads, individual RSA and SCL correlation coefficients were calculated for each dyad (see Creavy et al., 2020). Because this is measured as a correlation coefficient, possible scores range from - 1, which indicates that at each time point the change observed in adolescent RSA or SCL corresponds to the opposite change in parent RSA or SCL, to a score of + 1, which indicates a perfect correspondence in the direction of dynamic RSA or SCL for both parent and adolescent. A lack of synchrony, indicating that the adolescent's changes in RSA or SCL are unrelated to the changes observed in the caregiver, would be reflected by a score of 0.

Hypothesis Testing. I used multilevel modeling (MLM) to model the effects of time-varying (RSA, SCL) and non-time varying (contextual risk) factors. MLM allows for using a within-person repeated measures design and is currently recommended for the analysis of biological covariation between individuals (Skowron & Hastings, 2014).

The within-dyad associations in the RSA time series data were modeled using the equations below, in which $pRSA_{it}$ and $aRSA_{it}$ denote the ith parent's and adolescent's RSA values respectively at time t. Level 1 of the model predicting parent RSA involved the regression of adolescent concurrent RSA scores (per 60-s interval), denoted by β_{P2i}, controlling for the parent's RSA from one prior time point (a 60-s lag), denoted by β_{P1i}. In contrast, Level 1 of the

model predicting adolescent RSA involved the regression parent concurrent RSA scores, denoted by β_{A2i}, controlling for the adolescent's RSA from one prior time point (a 60-s lag), denoted by β_{A1i}.

$$pRSA_{t,i} = \beta_{P0i} + \beta_{P1i}pRSA_{t-1,i} + \beta_{P2i}aRSA_{t,i} + e_{Pt,i}$$

$$aRSA_{t,i} = \beta_{A0i} + \beta_{A1i}aRSA_{t-1,i} + \beta_{A2i}pRSA_{t,i} + e_{at,i} \quad (1)$$

To examine whether parent-adolescent synchrony of RSA differed by dyadic factors, the Level 2 equations were utilized. Thus, I examined between-dyad associations in the RSA time series data as a function of a number of contextual factors. Analyses were performed separately by the six contextual factors: engaged/warm parenting, intrusive/harsh parenting, parental depression symptoms, adolescent internalizing and externalizing symptoms, and history of child maltreatment).

$$\beta_{0i} = \gamma_{00} + \gamma_{01}(RiskFactor) + u_{0i}$$

$$\beta_{1i} = \gamma_{10}$$

$$\beta_{2i} = \gamma_{20} + \gamma_{21}(RiskFactor) + u_{2i} \quad (2)$$

Analyses examining SCL synchrony were similarly tested using MLM. Level 1 of the model involved the regression of adolescent SCL scores on to parent SCL scores (per 1-minute interval), controlling for adolescent SCL from one prior time point, and vice versa. The Level 1 equations were as follows:

$$pSCL_{t,i} = \beta_{P0i} + \beta_{P1i}pSCL_{t-1,i} + \beta_{P2i}aSCL_{t,i} + e_{Pt,i}$$

$$aSCL_{t,i} = \beta_{A0i} + \beta_{A1i}aSCL_{t-1,i} + \beta_{A2i}pSCL_{t,i} + e_{At,i} \quad (1)$$

Level 2 similarly included the main effect of contextual risk variables and used the same Level 2 equations stated above.

Results

Preliminary Analyses.

Descriptive correlational analyses of observed patterns of synchrony are reported in Table 5 and

illustrated in Figures 4 and 5. Specifically, correlation coefficients were calculated using the 10

minute-by-minute data points for each parent-adolescent dyad for RSA and for SCL. On average,

RSA synchrony correlation values ($M = .064$, $SD = .467$) were comparable to the average SCL

correlation synchrony values ($M = .051$, $SD = .497$). Synchrony correlation coefficients ranged

considerably from extremely negative ($r = .870$ RSA; $-.936$ SCL) to extremely positive ($r = .999$

RSA; $.827$ SCL), indicating significant heterogeneity in both the strength and direction of

synchrony across dyads. The distribution of correlations is highly similar to correlations of RSA

reported in a previous study (e.g., Creavy et al., 2020). To illustrate these patterns, time series

data are illustrated for three example dyads. Figure 6 illustrates (a) a dyad characterized by high

positive synchrony in which child and parent move in the same direction (RSA $r = .56$; SCL $r =$

$.68$), (b) a dyad characterized by negative synchrony in which parent and adolescent move in

opposing directions (RSA $r = -.50$; SCL $r = -.81$), and (c) a dyad displaying nonsynchrony,

where changes occurring in one partner are, on average, unrelated to the concurrent activity of

the other (RSA $r = .09$; SCL $r = .07$). Despite comparable ranges of synchrony in RSA and SCL,

the indices of synchrony in RSA and SCL did not correlate with one another ($r = .09$, $p = .56$),

indicating that dyads higher in RSA synchrony were not necessarily higher in SCL synchrony.

Dyadic synchrony did not differ between dyads with male compared to female children

for either RSA ($F(1,50) = .103$, $p = .41$) or SCL ($F(1,48) = 1.00$, $p = .15$). Neither RSA

synchrony nor SCL synchrony were correlated with child age ($r = .08$, $p = .57$; $r = .19$, $p = .19$,

respectively). SCL dyadic synchrony was significantly correlated with parent-report levels of adolescent externalizing symptoms ($r = .37$, $p < .05$) and emotional abuse ($r = .33$, $p < .05$), such that higher synchrony was related to greater presence of externalizing symptoms and greater exposure to emotional abuse. Parent current depression symptoms were not significantly correlated with dyadic RSA or SCL synchrony ($r = -.01$, $p = .92$; $r = .22$, $p = .13$, respectively). SCL dyadic synchrony was not correlated with any other subtype of childhood trauma (r's = .11 to .28, all p's > .10). Similarly, RSA dyadic synchrony was not correlated with any history of childhood trauma (r's = .13 to .18, all p's > .10).

Hypothesis Testing.

A multilevel coupled autoregression analysis was performed to examine how coregulation of RSA and SCL varied as a function of time (Level 1), and dyad (i.e., contextual risk; Level 2). In examining RSA, the intercept ($\beta_{A/P0i}$) for overall mean RSA was significant in predicting current RSA, $\beta_{A0i} = 3.14$, $t = 9.66$, $p < .001$; $\beta_{P0i} = 2.13$, $t = 6.07$, $p < .001$. Parents and adolescents displayed positive concordance in RSA over time such that their partner's concurrent RSA was positively associated with their own RSA, showing a dynamic dependence that varied across the interaction for adolescents, $\beta_{A2i} = .09$, $t = 2.08$, $p < .05$; and for parents, $\beta_{P2i} = .11$, $t = 2.46$, $p < .05$. In addition, RSA self-regulation (intraindividual variability) was significant, indicating that overall there was a within-person linear increase in RSA over time the during parent-adolescent interaction for adolescents, $\beta_{A1i} = .44$, $t = 9.74$, $p < .001$; and for parents, $\beta_{P2i} = .49$, $t = 11.31$, $p < .001$.

To address the hypothesis concerning contextual risk factors as moderators of parent-adolescent physiological synchrony, I conducted variants of the two-level MLM described above

with each potential moderator entered in level 2 as an independent predictor of the intercept (β_{0i}) and of the independent predictor of the parent-adolescent RSA linkage (β_{2i}). Convergence was not achieved with unstructured or autoregressive covariance structures. Convergence was only achieved when an identity matrix was imposed, and therefore I will not report or interpret the output for the Level-2 predictors.

The relationship between parent and adolescent sympathetic reactivity (i.e., SCL) was modeled in a similar fashion. For example, adolescent sympathetic reactivity was modeled as a function of parent sympathetic reactivity in a 2-level multilevel model where sympathetic reactivity at each minute was nested within dyad. Random intercepts were utilized for both the individual and the dyadic sympathetic reactivity. The MLM was first estimated with an autoregressive covariance matrix, which resulted in a non-positive definite Hessian matrix. Therefore, an identity matrix was used for analyses with adolescent sympathetic reactivity as the dependent variable. Convergence was not achieved with any covariance structure when parent sympathetic reactivity was entered as the dependent variable, and there I will only report output predicting adolescent SCL. MLM for sympathetic reactivity showed that while adolescent SCL self-regulation was significant $\beta_{A1i} = .994$, $t = 113.53$, $p < .001$, parents and adolescents did not display synchrony over the course of the 10-minute task $\beta_{A2i} = -.01$, $t = -.551$, $p = .58$. When entering Level-2 predictors, parent-adolescent sympathetic synchrony was not moderated by any contextual risk variables ($\gamma = .01$, intrusive/harsh parenting; $\gamma = -.01$ engaged/warm parenting; $\gamma = -.01$, parental depression symptoms, $\gamma = -.01$, emotional abuse; $\gamma = .00$, physical abuse; $\gamma = -.01$, sexual abuse; $\gamma = .00$, emotional neglect; $\gamma = .00$, physical neglect; all p's > .10).

Discussion: Study 2

Physiological synchrony between parents and children has been examined throughout development and is thought to reflect on a process by which parents support their children's ability to regulate emotional arousal (e.g., Calkins, Propper, & Mills-Koonce, 2013). This study is among the first to examine associations in both the sympathetic (SCL) and parasympathetic (RSA) systems between parents and adolescents in the context of an interaction task provoking dynamic exchanges about a current source of stress in their relationship. Results indicate that dyads varied considerably with regard both to the magnitude and direction of physiological synchrony.

In the first set of analyses utilizing a correlational approach, results indicate that the mean of RSA and SCL dyadic correlation coefficients for the overall sample were close to zero. However, the mean-zero correlation coefficients disguised meaningful variability in dyads who had synchrony as high as $r = .99$ and as low as $r = -.94$. Indeed, the range and pattern of synchrony correlation coefficients from this study are consistent with those reported in Creavy et al. (2020). In addition, results suggest that positive physiological synchrony of the sympathetic system (SCL) in the context of a stressful interaction task may be maladaptive for adolescents, as it is associated with more externalizing symptoms and more reported emotional abuse. This finding is also consistent with Creavy et al. (2020), who found that positive synchrony in a negative emotional condition had maladaptive implications. The current study extends literature on parent-child physiological synchrony by examining patterns of synchrony during an interactive conflict task, designed to elicit stress, rather than using a series of positive and negative film clips. By utilizing a conflict discussion task, the current study increased the ecological validity of the findings, which is an important step towards generalizing the existing physiological synchrony research to real-life settings.

The primary finding from the current study was that, overall, parent-adolescent dyads showed positive, dynamic concordance in RSA, though not SCL, over the course of a 10-minute interaction task. However, this concordance was not moderated by any parent-adolescent factors, including parenting behaviors (engaged/warm, intrusive/harsh), current parental depression symptoms, or history of childhood trauma. Prior research on physiological synchrony has similarly reported positive RSA concordance (Suveg et al., 2018), though this synchrony has been shown to be moderated by a number of factors including maternal history of major depressive disorder (MDD; Woody et al., 2016), child history of MDD (Amole, Cyranowski, Wright, & Swartz, 2016), social context (Lunkenheimer et al., 2017), and attachment style (Smith, Woodhouse, Clark, & Skowron, 2016). It is possible that our small sample size, disrupted by COVID-19, hindered our ability to detect moderation effects. Nonetheless, results from the current study indicate that RSA physiological synchrony extends beyond infancy and childhood into adolescence.

Research examining sympathetic synchrony is scarcer, and only one other known study has examined parent-child physiological synchrony using electrodermal activity (Baker et al., 2015). Baker et al. (2015) found an overall positive correlation of parent-child synchrony, and reported that child autism spectrum disorder (ASD) symptoms moderated the association between parent sympathetic reactivity and child sympathetic reactivity. It is important to note that while Baker et al. (2015) used a naturalistic free play interaction task, this study used a more structured conflict discussion task. It is possible that more structured tasks yield weaker SCL synchrony as it is an organizing force in the attention of parents and adolescents.

The bulk of research on parent-child physiological synchrony has focused on a single physiological indicator (e.g., RSA, Creavy et al., 2020; electrodermal activity, Baker et al.,

2015). The current study extends the literature on parent-child dynamics by examining both RSA and SCL, providing important information on similarities and differences in how physiological attunement operates across systems. Notably, while parents and adolescents display overall RSA synchrony, SCL synchrony was non-significant. RSA is considered a clear marker of parasympathetic processes (Porges, 1986) and plays an important role in growth and restoration. In contrast, SCL is a pure marker of sympathetic arousal, reflecting moment-to-moment reactivity. It is possible that while regulatory processes are linked between parents and adolescents, reactivity patterns are more closely affected by factors other than dyadic synchrony.

Strengths and Limitations

The focus of the current study on a sample of adolescents representing a continuum of exposure to adverse childhood experiences (ACES), including type, severity, and number of ACEs, is an important step toward better understanding the biological underpinnings of ANS development in youth exposed to early life stress. While a major methodological strength of our study, recruitment of this population, as well as the disruption of study activities due to COVID-19, hindered the ability to detect significant moderators of physiological synchrony. The findings should be considered in the context of study limitations. First, the modest sample size of 56 participants limited power and clinical interpretation. In addition, analyses were cross-sectional in nature, and additional longitudinal research, preferably that spans multiple developmental periods, is needed to clarify how parent-child synchrony develops across time. Finally, although the study sought to understand parent-adolescent physiological synchrony in the context of a stressful interaction task, the extent to which parents and caregivers experienced distress during the conflict discussion task was not measured. Previous research suggests that the adaptiveness

of parent-child synchrony varies depending on whether the parent and child are engaging in a positive versus negative task (Creavy et al. 2020); thus, measuring the induced affect is vital to understanding the role of parent-child physiological synchrony

Conclusion

Findings from the current study contribute to a small but growing literature on physiological synchrony. Results suggest that parent-adolescent dyads exhibit overall positive physiological synchrony of the parasympathetic system (RSA), but not the sympathetic system (SCL) during a conflict discussion task. No contextual risk factors (e.g., parent psychopathology, parenting behaviors, history of childhood trauma) significantly moderated this association. Further, in correlational analyses, SCL correlational synchrony values were significantly associated with more externalizing symptoms and more reported emotional abuse, suggesting that positive physiological synchrony in the context of a stress inducing conflict task may be maladaptive for adolescents.

CHAPTER IV

GENERAL DISCUSSION

Two primary questions related to the influence of parents on adolescent's ability to regulate emotional arousal were posed. First, are parenting behaviors associated with physiological reactivity in adolescents? And second, do parents' and adolescents' RSA and/or SCL levels demonstrate reliable linkages; and do characteristics of parents and adolescents moderate the parent-adolescent physiologic synchrony?

Findings provide new evidence on parenting characteristics related to physiological reactivity in adolescents. Specifically, Study 1 extended previous research by examining both branches of the autonomic nervous system together. Although parenting behaviors were not related to adolescent sympathetic (SCL) or parasympathetic (RSA) reactivity, findings from regression analyses suggest that baseline levels of RSA may serve as a protective factor in adolescents who exhibit a more reactive sympathetic nervous system. More research is necessary to assess the integration of these two important domains relevant to physiological arousal in adolescents.

A great deal of work has examined physiological synchrony in infants, and Study 2 contributes to a small but growing number of studies researching physiological synchrony in adolescents. In addition, Study 2 extends previous research by using an ecologically valid interaction paradigm, compared to previous studies, which examined synchrony using positive and negative film clips to evoke emotions (Creavy et al., 2020). Dyads in this study selected a current or recent topic of conflict in their relationship, engaged in a discussion, and responded

physiologically to the stressful paradigm in patterns representative of coactivation. The primary

finding for Study 2 suggested that, overall, parent-adolescent dyads showed positive, dynamic

concordance in RSA over time. However, this concordance was not significant in sympathetic

reactivity (e.g., SCL). Contextual risk factors were not significant moderators of parent-child

physiological synchrony, though this finding is inconsistent with a large body of work. In

correlational analyses, parent-adolescent SCL correlation synchrony values were positively

associated with more externalizing symptoms and more reported emotional abuse. Overall, it is

likely that synchrony is not straightforward, and is impacted by task demands as well as

individual, relational, and family factors.

Parents have a far-reaching effect on the development of children. An important objective

for investigators, therefore, is to better understand specific parent characteristics (e.g., parenting

behaviors, parents' physiological reactivity) that contribute to the healthy development of

children and adolescents. The combined results across studies presented in this dissertation

support a consistent picture and provide new evidence in support of the biopsychosocial

conceptualization of adolescent adjustment. Parenting behaviors, interactions between

physiological systems, and parent-adolescent physiological synchrony contribute to adolescent

internalizing and externalizing symptoms. Finally, while results from the current study were

somewhat limited by the sample size, this is an ongoing study with an opportunity to reexamine

the key hypotheses with a larger and richer sample of greater than 100 dyads.

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Table 1. Demographic characteristics of study participants.

	Adolescents	Caregivers
Age at assessment, *M* (*SD*)	12.21 (1.70)	42.04 (7.34)
Sex, *n* (%)		
Male	26 (46.4)	4 (7.1)
Female	30 (53.6)	52 (92.9)
Race, *n* (%)		
Asian	3 (5.4)	2 (3.6)
Black or African-American	13 (23.2)	11 (19.6)
White	38 (67.9)	42 (75.0)
More than one race	1 (1.8)	0 (0)
Other	1 (1.8)	1 (1.8)
Household income, *n*, (%)		
$15,000 or under	–	2 (3.6)
$15,000 - $29,999	–	3 (5.4)
$30,000 - $44,999	–	7 (12.5)
$45,000 - $59,999	–	8 (14.3)
$60,000 - $74,999	–	9 (16.1)
$75,000 - $89,999	–	5 (8.9)
$90,000 - $104,999	–	6 (10.7)
$105,000 - $119,999	–	3 (5.4)
$120,000 - $134,999	–	1 (1.8)
$135,000 - $149,999	–	4 (7.1)
$150,000 or more	–	7 (12.5)
Parent Relation, *n* (%)		
Mother	–	46 (82.1)
Father	–	2 (3.6)
Adoptive mother	–	4 (7.1)
Uncle	–	1 (1.8)
Stepmother	–	1 (1.8)
Aunt/adoptive mother	–	1 (1.8)
Adoptive father	–	1 (1.8)

Table 2. *Means, Standard Deviations, and Correlations among Variables in Study 1*

	1.	2.	3.	4.	5.	6.	7.	8.
1. Baseline RSA	−							
2. Baseline SCL	.06	−						
3. RSA-R conflict task	-.58**	-.06	−					
4. SCL-R conflict task	.26†	.09	-.12	−				
5. Internalizing Problems	-.09	-.10	.07	.10	−			
6. Externalizing Problems	-.20	-.14	.30*	.03	.32*	−		
7. Engaged/positive parenting	-.11	.24†	.05	.04	-.16	-.25†	−	
8. Intrusive/harsh parenting	.14	-.05	-.02	-.05	-.16	.30*	-.59**	−
Mean	6.21	13.08	.51	1.28	51.73	56.95	24.49	13.51
SD	1.09	7.55	.59	2.52	10.51	11.42	5.41	5.09

Note: †$p < .10$. *$p < .05$. **$p < .01$. RSA = Respiratory Sinus Arrhythmia; SCL = Skin Conductance Level; RSA-R = Respiratory Sinus Arrhythmia – Reactivity; SCL-R = Skin Conductance Level – Reactivity

Table 3. *Regression analyses of parenting behaviors and adolescent physiological reactivity predicting adolescent **internalizing symptoms**.*

	β	SE b	R^2
Model 1 $F(5, 47) = 1.71$, $p = .15$			.06
Engaged/Warm Parenting	-.31†	.32	
Intrusive/Harsh Parenting	-.39*	.32	
RSA-B	-.03	1.36	
SCL-B	-.10	.19	
RSA-B x SCL-B	-.14	.23	
Model 2 $F(5, 47) = 2.83$, $p < .05$			.15*
Engaged/Warm Parenting	-.35*	.28	
Intrusive/Harsh Parenting	-.42*	.30	
RSA-B	-.25	1.5	
SCL-R	.27†	.58	
RSA-B x SCL-R	-.35*	.77	
Model 3 $F(5, 45) = 1.68$, $p = .16$			.06*
Engaged/Warm Parenting	-.37*	.31	
Intrusive/Harsh Parenting	-.39*	.33	
RSA-R	.07	2.39	
SCL-R	.12	.54	
RSA-R x SCL-R	.10	1.08	
Model 4 $F(5, 45) = 1.54$, $p = .20$			.05
Engaged/Warm Parenting	-.35†	.32	
Intrusive/Harsh Parenting	-.40*	.33	
RSA-R	.07	2.38	
SCL-R	-.08	.20	
RSA-R x SCL-R	.05	.27	
Step 2a $F(5, 45) = 2.21$, $p < .10$			11†
Engaged/Warm Parenting x RSA-R x SCL-R	.26	1.53	
Step 2b $F(5, 45) = 1.75$, $p = .15$			.07
Engaged/Warm Parenting	-.39*	1.63	
Intrusive/Harsh Parenting x RSA-R x SCL-R	.07	1.05	

Note: In Model 4, all main effect predictors originally entered in Step 1 were included in Step 2a. There was no change in significance in the model nor in the main effects. Thus, only the interaction variable is included as a predictor in the Step 2a above. In Step 2b, the significance of engaged/warm parenting went from approaching significance to significant. Thus, it is included with the interaction variable in Step 2b above.

β = standardized beta; SE b = standard error of beta; RSA-B = Respiratory Sinus Arrythmia – Baseline; SCL – B = Skin Conductance Level – Baseline; RSA-R = Respiratory Sinus Arrythmia – Reactivity; SCL-R = Skin Conductance Level – Reactivity

Table 4. *Regression analyses of parenting behaviors and adolescent physiological reactivity predicting adolescent **externalizing symptoms**.*

	β	SE b	R^2
Model 1 F(5, 47) = 1.78, p = .14			.07
Engaged/Warm Parenting	-.13	.26	
Intrusive/Harsh Parenting	.24	.26	
RSA-B	-.21	1.12	
SCL-B	-.13	.15	
RSA-B x SCL-B	.13	.19	
Model 2 F(5, 47) = 1.49, p = .21			.05
Engaged/Warm Parenting	-.14	.25	
Intrusive/Harsh Parenting	.25	.26	
RSA-B	-.20	1.34	
SCL-R	.09	.50	
RSA-B x SCL-R	.06	.67	
Model 3 F(5, 45) = 2.74, p < .05			.15*
Engaged/Warm Parenting	-.13	.25	
Intrusive/Harsh Parenting	.24	.26	
RSA-R	.35*	1.8	
SCL-R	-.11	.16	
RSA-R x SCL-R	-.21	.21	
Model 4 F(5, 45) = 2.15, p < .10			.10†
Engaged/Warm Parenting	-.14	.25	
Intrusive/Harsh Parenting	.21	.26	
RSA-R	.33*	1.9	
SCL-R	.09	.43	
RSA-R x SCL-R	-.01	.85	
Step 2a F(5, 45) = 2.15, p < .10			10†
Engaged/Warm Parenting x RSA-R x SCL-R	-.01	1.20	
Step 2b F(5, 45) = 2.21, p < .10			.11†
Intrusive/Harsh Parenting x RSA-R x SCL-R	.07	1.05	

Note: In Model 4, all predictors originally entered in Step 1 were included in Step 2. There was no change in significance in the model nor in the main effects. Thus, only the interaction variable is included as a predictor in the model above.

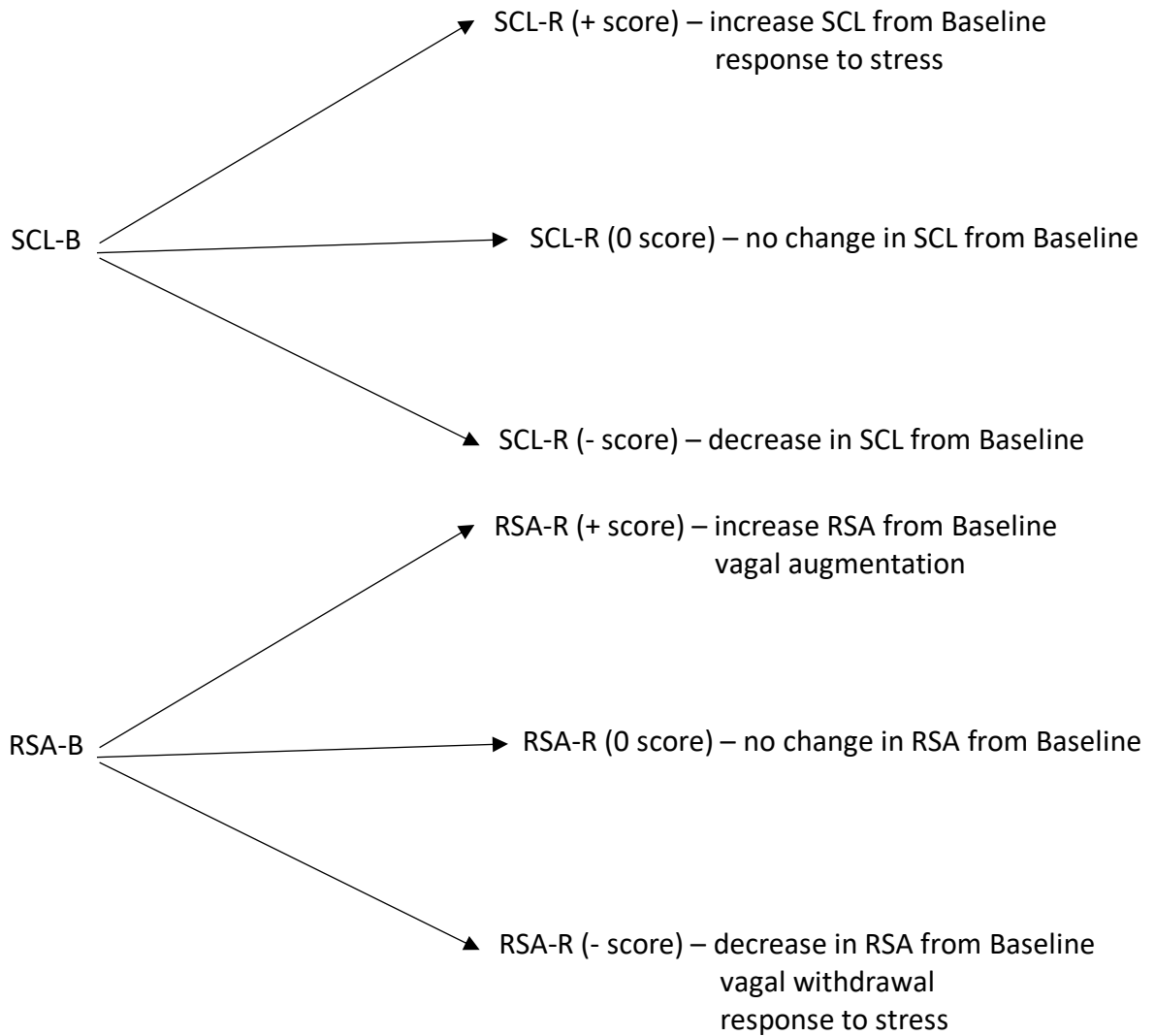β = standardized beta; SE b = standard error of beta; RSA-B = Respiratory Sinus Arrythmia – Baseline; SCL – B = Skin Conductance Level – Baseline; RSA-R = Respiratory Sinus Arrythmia – Reactivity; SCL-R = Skin Conductance Level – Reactivity

Table 5. *Means, Standard Deviations, and Correlations among Variables in Study 2*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Engaged/Warm Parenting	−											
2. Intrusive/Harsh Parenting	-.59**	−										
3. Parental depression	-.15	-.08	−									
4. Emotional Abuse	-.26†	.01	.33*	−								
5. Physical Abuse	-.14	-.10	.26†	.78**	−							
6. Sexual Abuse	-.23†	-.07	.19	.71**	.78*	−						
7. Emotional Neglect	-.21	-.08	.19	.46**	.26†	.10	−					
8. Physical Neglect	-.12	-.13	.23†	.75**	.78**	.73**	.42**	−				
9. Internalizing symptoms	.32*	-.16	-.16	.31*	-.03	.09	.25†	.12	−			
10. Externalizing symptoms	-.25	.30*	.20	.45**	.23	.09	.22	.21	.16	−		
11. RSA Synchrony	-.03	-.05	-.01	.03	.18	.12	.04	.18	-.09	.01	−	
12. SCL Synchrony	-.18	.12	.22	.33*	.11	.15	.27†	.20	.01	.37**	.09	−
Mean	24.49	13.50	4.91	8.88	6.16	6.13	7.21	6.50	51.73	56.95	.06	.05
SD	5.41	5.09	4.46	4.22	2.75	3.88	2.72	2.67	10.51	11.42	.47	.50

Note: $^\dagger p < .10$. $*p < .05$. $**p < .01$. RSA = Respiratory Sinus Arrhythmia; SCL = Skin Conductance Level;

SCL-B

SCL-R (+ score) – increase SCL from Baseline
response to stress

SCL-R (0 score) – no change in SCL from Baseline

SCL-R (- score) – decrease in SCL from Baseline

RSA-B

RSA-R (+ score) – increase RSA from Baseline
vagal augmentation

RSA-R (0 score) – no change in RSA from Baseline

RSA-R (- score) – decrease in RSA from Baseline
vagal withdrawal
response to stress

Figure 1. Physiological responses to stress
RSA-B = Respiratory Sinus Arrythmia – Baseline; SCL – B = Skin Conductance Level –
Baseline; RSA-R = Respiratory Sinus Arrythmia – Reactivity; SCL-R = Skin Conductance Level
– Reactivity
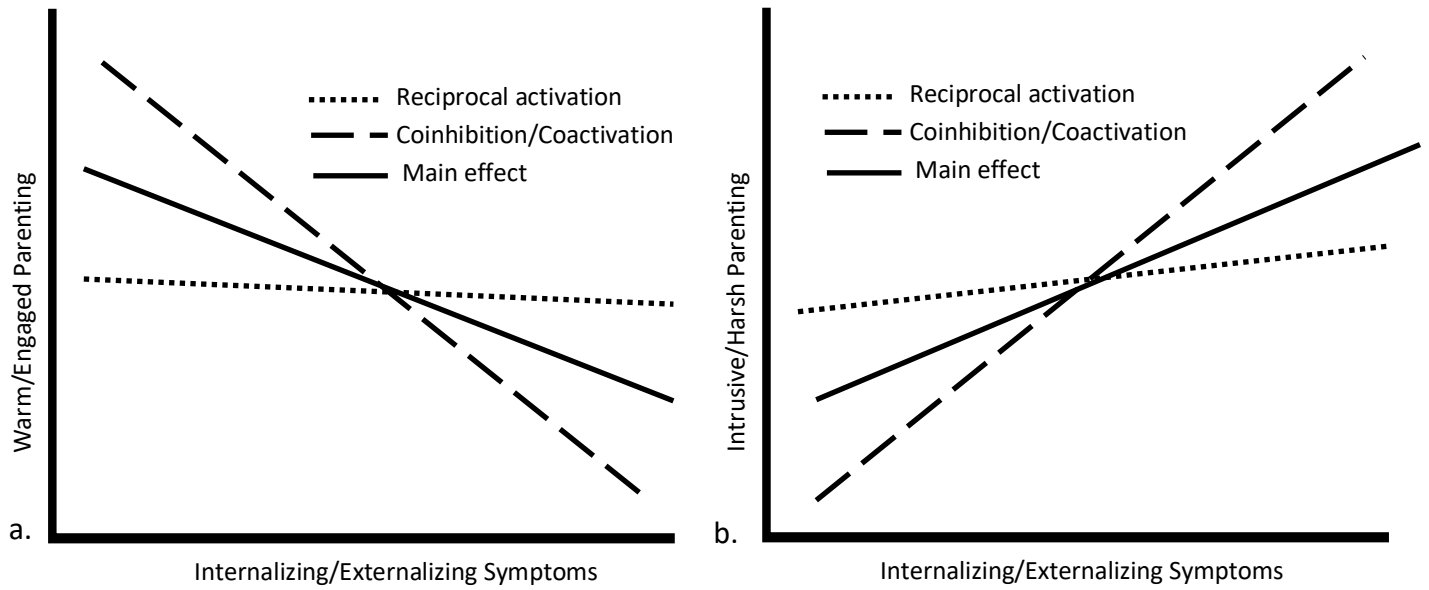
Figure 2. Moderation model interactions of youth physiological reactivity and parenting in predicting internalizing and externalizing symptoms. Models will be repeated separately for youth internalizing and externalizing symptoms.
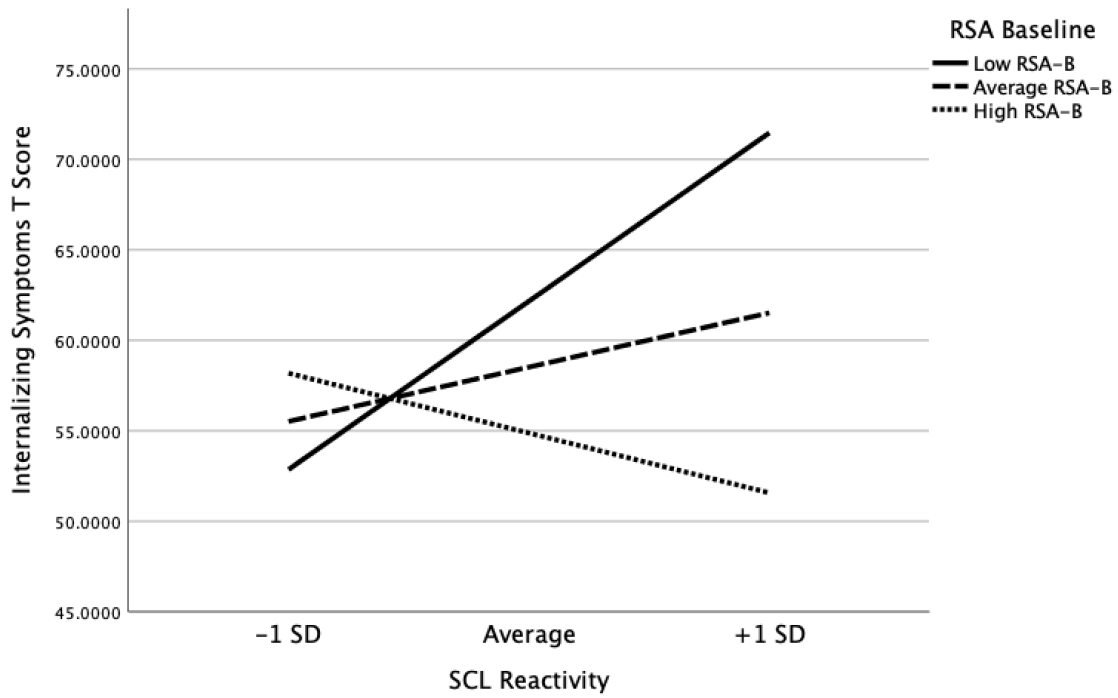
Figure 3. Interaction of RSA-B and SCL-R as predictors of adolescent internalizing symptoms, such that there was a significant positive effect of SCL-R on internalizing symptoms only for adolescents with low RSA-B.
RSA = Respiratory Sinus Arrythmia; RSA-B = Respiratory Sinus Arrythmia – Baseline; SCL = Skin Conductance Level
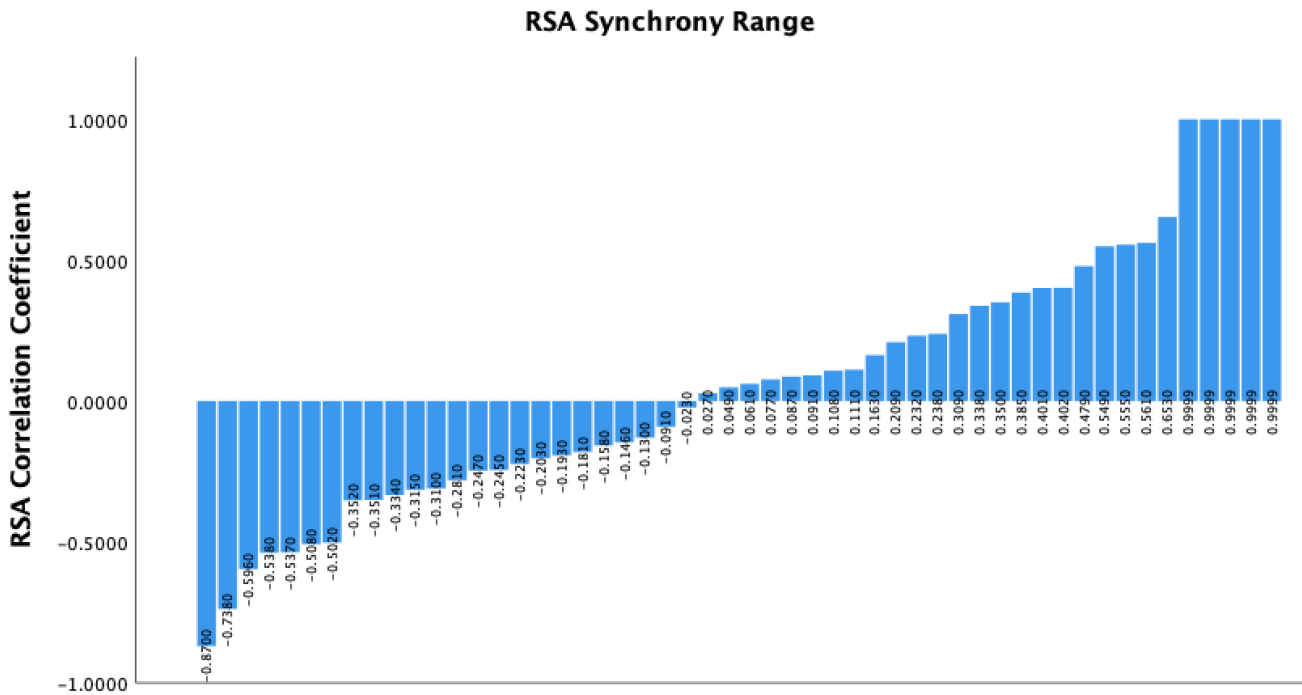
Figure 4. RSA synchrony values for each dyad ranged from extremely negative to extremely positive.
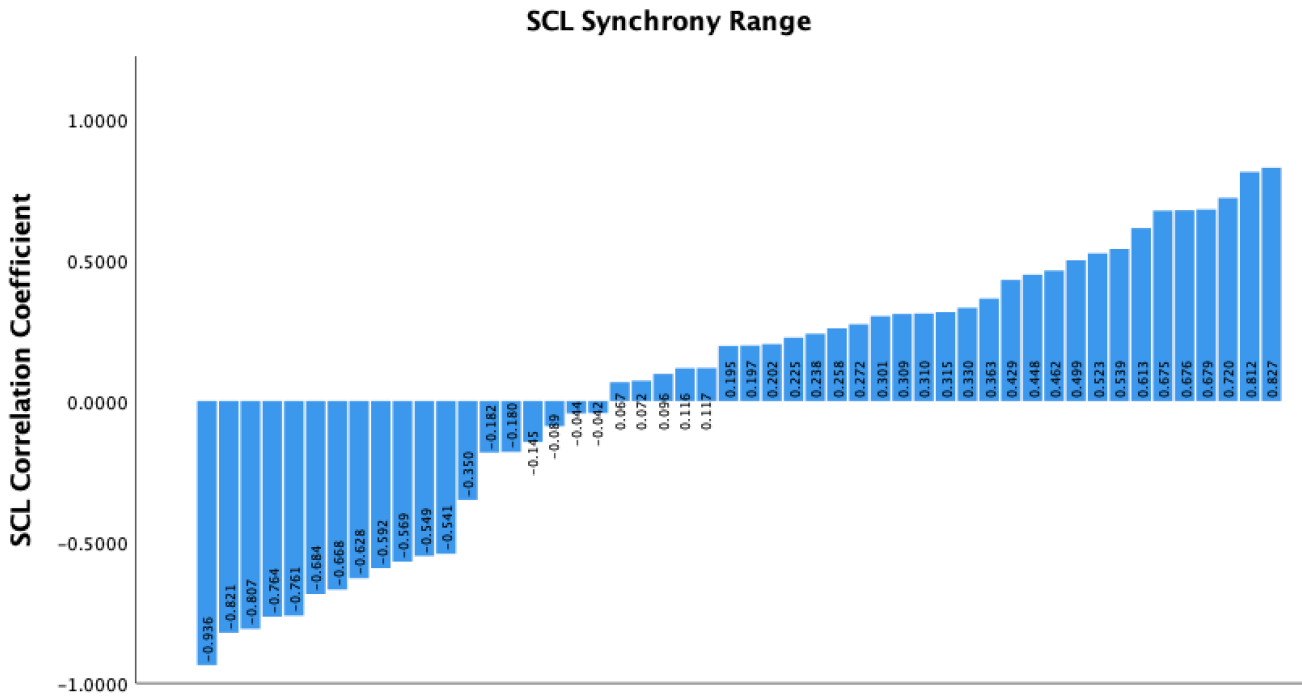
Figure 5. SCL synchrony values for each dyad ranged from extremely negative to extremely positive.
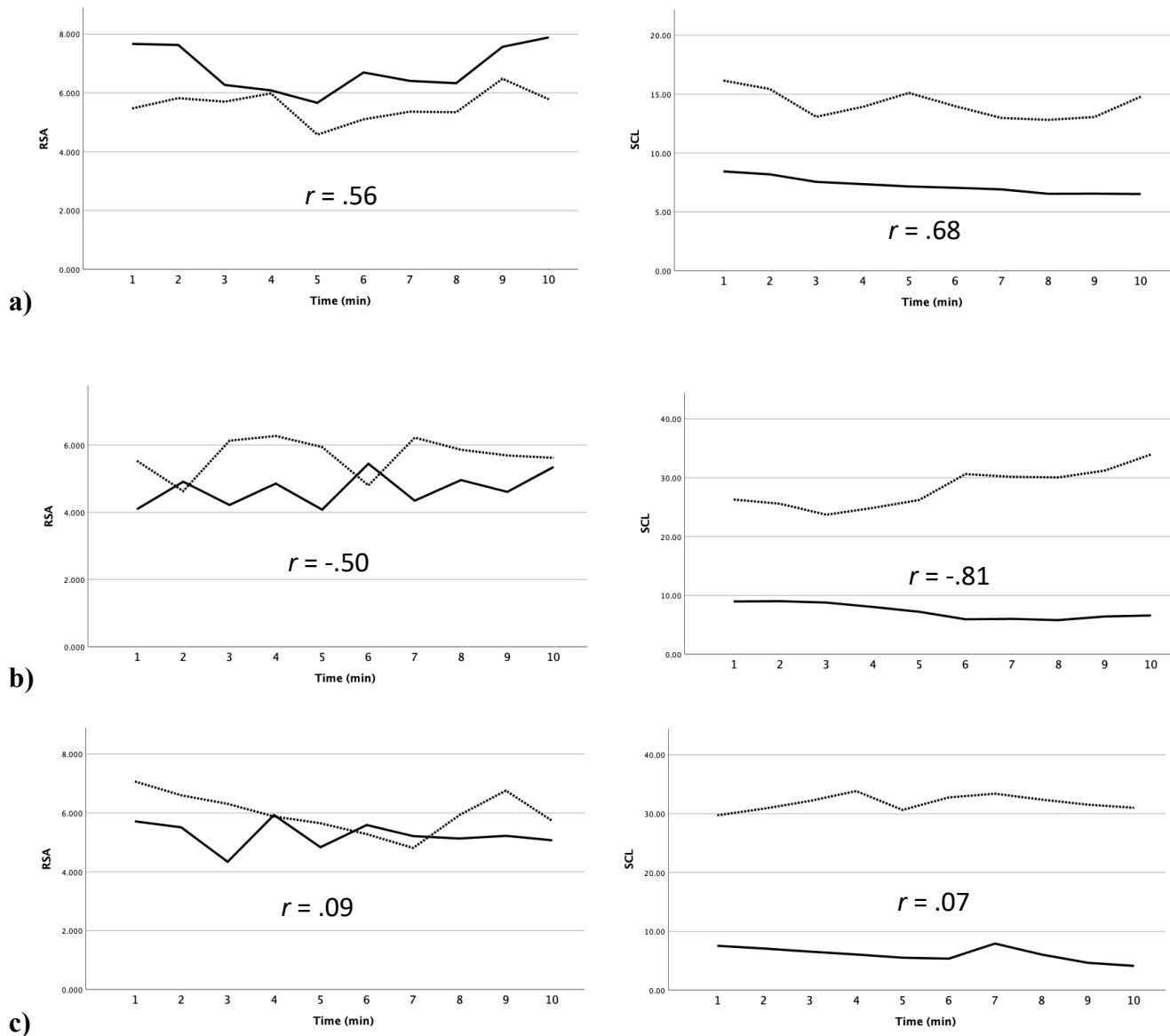
Figure 6. Illustrations of time series of dyads with (a) positive synchrony, (b) negative synchrony and (c) non synchrony. Parent RSA (respiratory sinus arrhythmia) and SCL (skin conductance level) are represented by solid lines and adolescent RSA and SCL is represented by dashed lines.

Appendix A. Iowa Family Interaction Rating Scales

The Iowa Family Interaction Rating Scales

Janet Melby, Rand Conger, Ruth Book, Martha Rueter,
Laura Lucy, Daniel Repinski, Shauna Rogers,
Barbara Rogers, & Laura Scaramella

1998

i

The Iowa Family Interaction Rating Scales
– REVISED VERSION

3

ACKNOWLEDGMENTS

This edition is the fifth revision of *The Iowa Family Interaction Rating Scales* (Melby et al., 1989, 1990, 1991, and 1993). The initial coding manual borrowed heavily from the work of many investigators. It was adapted primarily from the *Global Coding Scale* developed by Hetherington and Clingempeel with significant modifications and revisions based upon experience coding families living in Iowa, as well as a review of the content of other coding systems. The other coding systems that most strongly influenced the first three editions were: the *Social Interaction Scoring System* by Conger (1971); *Rapid Couples Interaction Scoring System (Gottman, 1987); Family Process Code (FPC)* developed at the Oregon Social Learning Center (Dishion et. al., 1987); *Interactional Dimensions Coding System* prepared at the University of Denver by Julien, Markman, Lindahl, Johnson, and Van Widenfelt (1987); *Living in Family Environments (LIFE) Coding System* from the Oregon
Research Institute (Hops et. al., 1987); and the *Parent Adolescent Negotiation Interaction Code (PANIC)* by Forgatch and Wieder (1981). Complete citations for these systems are included in the reference list at the end of this manual.

For the immediately proceeding and significantly revised fourth edition of *The Iowa Family Interaction Rating Scales* (1993), we drew from our own experiences using past revisions of the coding manual and from *Observing Emotional Communication*, a revision of the *SPAFF Manual* (Gottman, 1989) prepared at the Oregon Social Learning Center by Forgatch, Ryan, Friediman, and Luks (1992). We also switched from a 5- point to a 9-point scale.

In this fifth edition we draw primarily on our own experiences during the most recent five years in training observers to apply these scales to numerous interactions among various combinations of family members and friendship pairs. Although labeled as family rating scales, these scales have been used effectively at our research site and at other sites to code behaviors of non-family groups (e.g., friend pairs, patients and caregivers). *Most recently, these scales have been adapted for use in coding behaviors of young children by including descriptions of particularly characteristic behaviors identified by Laura Scaramella, Jan Melby, Shauna Rogers and Barbi Greenlaw. We added three new parenting scales, adapted from Qualitiative Ratings: Parent/Child Interaction at 24-36 Months of Age (Cox, 1997). The information especially relevant to coding behaviors of parents and young children in activity-based tasks is presented in italicized type.* Included in an appendix are definitions for behavioral scales contained in previous editions but not currently in use. Some of these scales could be of use in future observational research endeavors. Information on past use of this instrument is summarized in Melby and Conger (in press) and Lorenz and Melby (1996).

Particularly significant contributions for the first edition were made by Dan Repinski in development of the Parenting Scales and by Martha Rueter and Laura Lucy in revisions of the Problem-Solving Scales. Appreciation is expressed to Shauna Rogers and Barbara Rogers for contributions to the revision of this fifth edition, to the current and past cadre of over 90 observers for their helpful insights, and to Sylvia Summers, Arlis Penner, and Pita Petrus for typing revisions for this latest edition.

Please note that this version of the fifth edition is identical in content to another version of this edition but is presented here in condensed format for ease of electronic and/or microfiche distribution. To obtain a copy of the larger type extended-format version, please contact the first author.

IOWA FAMILY INTERACTION RATING SCALES AT A GLANCE *

Engaged/Warm Parenting

LR	Listener Responsiveness		**CO**	Communication
WM	Warmth		**PO**	Positive Reinforcement
CC	Sensitive/Child Centered (Parent)		**IR**	Inductive Reasoning (Parent)

Intrusive/Harsh Parenting

LM	Lecture/Moralize		**NT**	Intrusiveness
HS	Hostility		**GC**	Guilty Coercion

TERMS FREQUENTLY USED IN THE CODING MANUAL

1. **Affect**: the vocal tone and emotional expression (facial and body) that accompany verbal behavior and convey the focal's feelings and emotional state; considered to be part of the focal's nonverbal behavior.

2. **Coding**: the act of measuring or quantifying individual, dyadic, or group behavior into discrete symbols or a series of digits (synonymous with the term "rating").

3. **Focal**: the person whose behavior is being observed and coded (rated) by the observer. The focal will vary depending upon the phase in observing the interaction task.

4. **General Scales**: scales used to assess the behaviors of group members in all task settings. Scales are of three levels: Individual Characteristic Scales, Dyadic Interaction Scales, and Dyadic Relationship Scales.

    a. **Individual Characteristic Scales**: behavior scales that describe the general mood or state of being of a person regardless of with whom that person is interacting.

    b. **Dyadic Interaction Scales**: behavior scales designed to assess the behavior directed by one person toward another person in an interaction context.

    c. **Dyadic Relationship Scales**: behavior scales designed to assess the relationship between two interactors. Both persons receive the same score. These scales assess characteristics of a dyad's relationship rather than behaviors of individuals.

5. **Interactor(s)**: the person(s) with whom the focal talks or interacts during the task.

6. **Interaction Task**: the type of semi-structured situation in which study participants are asked to discuss various topics. Tasks vary in length (15, 20, 25, or 30 minutes), number of people present (2, 3, or 4 people), nature of the discussion (general topics, problem-solving topics, parenting topics), and relationship of participants (friend pairs, married couples, or parent(s) and child(ren)).

7. **Nonverbal Behavior**: behaviors associated with how something is said as well as to all physical movements, including movements that accompany verbal messages. Examples are voice tone, body posture, gestures, facial expressions, etc.

8. **Operational Definition**: the specific meaning assigned to each behavioral category (scale) in this manual for purposes of this coding system.

9. **Parenting Scales**: a series of behavioral scales used specifically to assess the nature of the adult's interaction, as a parent, with his/her child. Inference may be made about parental behavior outside the task situation from comments made during the structured interaction task.

For example, the rating for **Child Monitoring** is based both on observed task interactions and on family discussions about what normally happens at home. Consideration is given to information about parental behavior provided by adults and children.

10. **Primary Coder**: the observer who independently scores group interactions and individual behaviors and whose scores become part of the final data set to be used for statistical analyses.

11. **Reliability Coder**: the second observer who independently scores group interactions and individual behaviors, in addition to the primary coder, and whose scores are used to determine the degree of interobserver agreement by comparing them with the primary coder's scores.

12. **Scale**: the name or label given to a particular set of behaviors or characteristics that vary along a continuum (e.g., from '1' to '9') (synonymous with "category" or "behavioral code").

13. **Verbal Behavior**: the content of <u>what </u>a person says.

IOWA FAMILY INTERACTION RATING SCALES

Abbreviated Operational Scale Definitions

I. **General Interaction Rating Scales**

  A. **Individual Characteristic Scales**

  1. **Positive Mood** (**PM**): expressions of contentment, happiness, and optimism toward self, others, or things in general.

  B. **Dyadic Interaction Scales**

  1. **Hostility** (**HS**): the extent to which hostile, angry, critical, disapproving rejecting or contemptuous behavior is directed toward another interactor's behavior (actions), appearance, or personal characteristics.

  2. **Lecture/Moralize** (**LM**): telling another interactor how to think, feel, etc., in a way that assumes the focal is the expert and/or has superior wisdom; at high levels may provide little opportunity for the other interactor to respond, initiate, or think independently.

  3. **Warmth/Support** (**WM**): expressions of care, concern, support, or encouragement toward another interactor.

  4. **Listener Responsiveness** (**LR**): the focal's nonverbal and verbal responsiveness as a listener to the verbalizations of the other interactor through behaviors that validate and indicate attentiveness to the speaker.

  5. **Communication** (**CO**): the speaker's ability to neutrally or positively express his/her own point of view, needs, wants, etc., in a clear, appropriate, and reasonable manner, and to demonstrate consideration of the other interactor's point of view. The good communicator promotes rather than inhibits exchange of information.

II. **SPECIALITY SCALES**

  A. **Parenting Scales***

  1. **Positive Reinforcement** (**PO**): the extent to which the parent responds positively to the child's "appropriate" behavior or behavior that meets specific parental standards.

  2. ***Intrusive (NT)**: the extent to which the parent is domineering and overcontrolling during interactions with their child; parent's behavior is adultcentered rather than child-centered.*

  3. ***Sensitive/Child-Centered (CC)**: parent's responses to child are appropriate and based on child's behavior and speech; they offer the right mix of support and*

independence so child can experience mastery, success, pride, and develop effective self-regulatory skills.

4. **Guilty Coercion (GC):** degree to which the focal achieves goals or attempts to control or change the behavior or opinions of the other by means of contingent complaints, crying, whining, manipulation, or revealing needs or wants in a whiny or whiny-blaming manner.

INTRODUCTION TO

THE IOWA FAMILY INTERACTION RATING SCALES

OVERVIEW

When people interact with each other they communicate through what they say, as well as through their tone of voice, facial expression, eye contact, and body position. All of these aspects combine to influence the messages relayed.

The Iowa Family Interaction Rating Scales are designed to measure behavioral characteristics of individuals and the quality of behavioral exchanges between group members occurring in interaction settings of two, three, or four people. The scales are intended to tap both verbal and nonverbal behaviors, as well as affective and contextual dimensions of interaction.

In the original version of the coding system, there were a total of 60 scales: 30 scales are general scales used to describe behaviors or characteristics of adults and children, *plus 2 scales used only for scoring behaviors of young children*; 2 scales measure characteristics of dyads; 1 scale assesses group interaction; 15 scales rate parenting behavior and are used specifically for scoring behavior of adults in tasks that involve adults and children *(3 of these are used only for scoring parents of young children)*; 10 scales describe problem solving behaviors and are used for scoring behaviors of adults and children that occur during a problem-solving task.

This version of the macrocoding system revised for the Family Depression Prevention project includes 29 scales (four original codes, 21 revised codes, and four new codes added to the system).

Three general types or levels of behavior are rated: (1) Individual Characteristic Scales (such as **Sadness**) assess the general characteristics or traits of the individual being observed (the focal) and do not include the designation of a recipient; (2) Dyadic Interaction Scales (such as **Hostility** and **Warmth/Support**, as well as the Parenting Scales such as **Consistent Discipline** and **Quality Time**), assess the behavior of the focal toward a specific interactor; (3) Dyadic Relationship Scales (such as **Relationship Quality**) measure some characteristic of the relationship between two interactors and each dyad receives a single score.

EXPLANATION OF RATING SCALE DESCRIPTIONS

In the descriptions of the rating scales that are presented in this manual, the following format will be used for defining each scale:

A. **Name and abbreviation of scale**: The scale name indicates the word or combination of words by which a scale is regularly known. The abbreviation is a two-letter referent that stands for the scale and is used on coding forms.

B. **Rate**: This indicates who is to be rated for a particular scale. Not all scales are rated for all participants. The term "All" indicates that all participants are coded while "Parent" indicates that only parents or caregivers are coded. The terms "Group," "Dyadic Interaction," "Dyadic

Relationship," and "Individual Characteristic" refer to the level(s) of interaction to be coded. "Individual Characteristic" scales involve a score for each person to be coded but the behavior does not include the designation of a recipient. "Dyadic Interaction" scales are those which involve both a sender and recipient, "Dyadic Relationship" scales are scores for the dyad as a unit, and "Group" scales are scored for the interaction unit as a whole (i.e., all participants as a group).

C. **Definition of scales**: This section includes the scale definition and descriptions of code or score levels '1' through '9'.

D. **Clarifications:** This section provides further definition of the scale and information concerning differentiation between the scale levels and among related scales. It provides instructions for coding specific rating scales and lists descriptors to help identify (1) the low and high extremes of the scales being rated, and (2) the different ways that adults and children may display the same behavior. The descriptors are <u>not</u> intended to be exhaustive representations of the behavior being expressed. They are merely GUIDELINES to help in identifying the different levels of a particular behavior and should always be interpreted in light of the definition of the scale.

E. **Examples**: Some scales include examples to illustrate the use of the code. In addition, many scales indicate "nonexamples" of the behavior.

MECHANICS OF CODING*

A. **Code observed and referenced past/outside of task behaviors**: Code any behaviors that you observe during the task as well as behaviors that the dyad discuss as having occurred outside of the task. Do not try to "read in" reasons or motivation for what is happening or how the individual is behaving. Do not make assumptions like, "Oh, they're just acting like that or saying that because of the camera." Code what you see and hear, not the possible causes of what you see and hear.

B. **Scoring considerations**: Determine the rating for each scale by considering five pieces of information:

1. frequency of the behavior
2. intensity of the behavior
3. affective (emotional) tone of the behavior
4. context in which the behavior occurs
5. proportion of interaction during which the behavior is displayed

Also consider frequency, intensity, affect, and proportion and context when determining distinctions between the different levels of a given rating scale.

C. **Frequency:** In this coding system, frequency refers to the quantitative dimension of the behaviors. The number of times a behavior occurs is of key importance in determining frequency. If frequency is considered of key importance, the scale could not be scored at a '7', '8' or '9' level based on only one occurrence of the behavior. Although frequency is important for most scales, it is of primary importance for **Listener Responsiveness**.

*Information in the Mechanics of Coding section is summarized in Appendix A

D. **Intensity**: In this coding system, intensity refers to the qualitative dimension of the behaviors. Affect is a very important component of intensity (see E below), but intensity can also be thought of as the strength or forcefulness of a behavior. For some scales, even one very intense occurrence of the behavior can be coded at a '7', '8' or '9' level. The following list indicates the relative importance of intensity in determining the appropriate rating for each scale:

1. Intensity Low in Relevance

   a. General Scales

      (1) Listener Responsiveness (LR)

2. Intensity Moderately Relevant

   a. General Scales

      (1) Externalized Negative (EX)
      (2) Lecture/Moralize (LM)
      (3) *Defiance (DF)*
      (4) *Compliance (CP)*
      (5) Communication (CO)
      (6) Antisocial (AN)
      (7) Relationship Quality (RQ)

   b. Parenting Scales

      (1) Quality Time (QT)
      (2) Consistent Discipline (CD)
      (3) Inconsistent Discipline (ID)
      (4) Positive Reinforcement (PO)
      (5) Encourages Independence (EI)
      (6) Child Monitoring (CM)
      (7) Inductive Reasoning (IR)
      (8) Effective Instructions (IN)

*Intensity is important for determining the individual behaviors that are a part of these scales, but these scales rely more on frequency to move to high levels.

3. Intensity Highly Relevant

   a. General Scales

   (1) Sadness (SD)
   (2) Anxiety (AX)
   (3) Positive Mood (PM)
   (4) *Defiance (DF)*
   (5) Hostility (HS)
   (6) Warmth/Support (WM)

  b. Parenting Scales

   (1) Withdrawn (WD)
   (2) Indulgent Permissive (IP)
   (3) Harsh Discipline (HD)
   (5) *Intrusive (NT)*
   (6) *Sensitive/Child-Centered (CC)*

E. **Affect**: This behavioral rating scheme places strong emphasis on the role of emotional affect in determining scales and scale levels. Affect refers to the way a message is conveyed rather than the verbal content of the message. See pp. 11-12 for a more extensive discussion of the role of affect in this rating scheme.

F. **Context**: In this coding system, context refers to the circumstances, events, and situations surrounding the behaviors that help to explain and give meaning to the behaviors. Context includes such things as the timing of behaviors and the behaviors immediately preceding or following a specific act.

G. **Proportion**: The proportion of total interaction represented by a particular behavior is an important consideration, but should be weighed slightly less than affect, frequency, intensity, and context. For example, if a person speaks infrequently but almost all of his or her verbalizations are hostile, rate higher on **Hostility** because of the high proportion of hostile comments even in the face of their fairly low frequency. Ask whether or not the occurrence of a behavior is high, compared to the total frequency of other behaviors. Think about how a particular behavior "characterizes" the interaction.

H. **General coding scheme**: The general scheme to use in determining the appropriate code level for most behavioral scales is based on a '1' to '9' scale. In this scheme, if the behavior does not occur, score '1'; if the behavior does occur, select the appropriate level (from '2' to '9') to indicate how characteristic the behavior is of the individual, dyad, or group being observed:

Code 1 = Not at all characteristic:
  Score '1' if the behavior does not occur or if you have a general feeling that the behavior occurred but cannot describe a specific instance or example of the behavior. No concrete or discernible evidence of the behavior exists.

Code 2 = More than a '1', but not quite a '3'. Slight evidence, extremely brief or fleeting. Score is "grudgingly" given. (**Note: do <u>not</u> give a '2' if you are unsure whether or not to count a particular behavior**).

Code 3 = **Minimally characteristic:**
Score '3' if the behavior almost never (rarely or infrequently) occurs or occurs just once and is of low intensity ("minimal evidence", "rarely", "some evidence"). You must be able to describe a specific example of the behavior. If you are not certain that a behavior qualifies for inclusion in the scale, score '1'. For a score of '3' there must be definite evidence of the behavior.

Code 4 = More than a '3', but not quite a '5'.

Code 5 = **Somewhat characteristic:**
Score '5' if the behavior sometimes (occasionally) occurs and is at a low or moderate level of intensity. At this level the behavior occurs more frequently for low-intensity behaviors, but may occur less frequently for behaviors of moderate intensity. There is occasional evidence of the behavior.

Code 6 = More than a '5', but not quite a '7'.

Code 7 = **Moderately characteristic:**
Score a '7' if the behavior occurs fairly consistently or is of elevated intensity. Intensity may be at a low or moderate level for behaviors occurring fairly often or at a fairly high level for behaviors occurring less frequently. There is fairly high or more extreme evidence of the behavior.

Code 8 = More than a '7', but not quite a '9'.

Code 9 = **Mainly characteristic:**
Score a '9' if the behavior occurs frequently or with significant intensity ("considerable evidence," "consistently"). Use this level for behaviors of low or moderate intensity that occur frequently or for rare behaviors of high intensity. There is considerable or high evidence of the behavior. Note: You will rarely see <u>all the descriptors</u> for a scale; all of them don't have to be present to score a '9'.

I. **Score distribution**: The general coding scheme, in terms of distributions on a bell curve, should be thought of as shown below:

midpoint

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 9+ |

unchar   min   some   mod   main
            char   char   char   cha

rather than:

midpoint

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
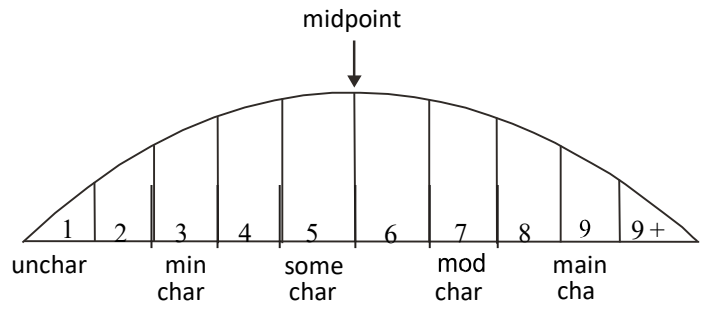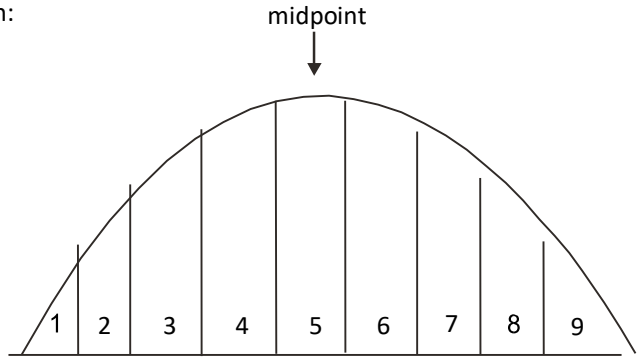
Think of the '1' and the '9' as the two anchors for the scoring system. At a '1' level there is no concrete evidence of the behavior; at a '9' level such evidence is considerable. For varying degrees of behaviors, select the appropriate level from '2' to '9'. Notice that the midpoint of the distribution is between a '5' and a '6' rather than at '5'. In addition, the '9' category can be thought of as ranging from low to high. For example, a '9' on **Sadness** does <u>not</u> include only clinically depressed people; such a case would be an example of an extreme '9' (i.e., a '9+') on **Sadness**. Caution: Remember to start at a '1' until you see examples of a behavior even though the midpoint on this general scheme (the first bell curve shown) is between a '5' and a '6'. Do not start off with the assumption that the focal is at the midpoint.

J. **Equal interval scale**: In coding, consider each of the categories above '1' ('2' through '9') to be intervals of approximately equal size. One category does <u>not</u> necessarily capture a broader range of behavior than another, except in the case of a score of '9' which captures frequent and very frequent. Do not use categories '5' or '6' as "default" categories when you are unsure about what to code.

K. **When in doubt rule**: As a general rule, if debating between assigning a score of '1' or '2', code down. On the other hand, if debating between assigning a score between scores of '2' or higher, (i.e., '2' or '3', between '3' or '4', etc.) code up. In other words, if you are unsure whether the score is a '1' or a '2', code a '1'. However, if you are unsure whether a behavior is a '2' or a '3', score a '3'; if you are unclear whether a behavior is a '6' or a '7', score a '7', etc. (See O below for an exception to this rule).

L. **Exceptions**: Listed below are scales that are coded using levels that are exceptions to the code level definitions ('1' - '9') described in the general scheme in Section H on pages 4 and 5. In the section of this manual containing descriptions of scales, any such exceptions are indicated with a double asterisk (**) beside the scale name. These scales include:

1. Rater Response
2. Relationship Quality
3. Listener Responsiveness
4. Communication

M. **Scores with '5' as neutral or mixed**: There are some scales for which 1 = negative, 5 = neutral or mixed, and 9 = positive (e.g., **Relationship Quality**, **Rater Response**). For these scales, if in doubt between '1' and '2', '2' and '3', '3' and '4', or '4' and '5', code down; conversely, if in doubt between '5' and '6', '6' and '7', '7' and '8', or '8' and '9', code up. In other words, score toward the ends of the scale.

N. **Plus scales**: Two scales are exceptions to the general scheme because they allow a '1' level to be used to indicate rarely or never. These scales are **Communication** and **Listener Responsiveness.** They are frequently referred to as "plus scales" and '5' is considered the midpoint.

O. **Subjective scales**: Observers should objectively assess behaviors using the definitions and clarifications specified for each scale. The only scale that explicitly allows for the observer's subjective judgments is **Rater Response**.

P. **Relevance of age**: Take the age of the focal into consideration only when scoring for **Antisocial**, **Emotional Caretaking, and Instrumental Caretaking** (particularly at high levels).

Q. **Importance of nonverbal cues**: Consider both verbal and nonverbal cues when coding behaviors. In determining the score for a particular behavior when the verbal content appears to conflict with the nonverbal contents, give more weight to the nonverbal cues (i.e., tone of voice, gestures, facial expression, etc.). Nonverbal behavior (including affect) carries more weight than verbal content.

R. **Unclear or ambiguous behaviors**: When it is impossible to determine whether a particular behavior (such as a physical contact) is positive or negative, or when unclear messages are delivered (such as a possible compliment delivered in what could be a negative manner, but you are unsure), do not code as either positive or negative. Do not code unclear or ambiguous behaviors. If two coders cannot come to consensus on a code, bring the example to the group for a group consensus.

V. **Not mutually exclusive**: The scales that comprise the coding system are <u>not</u> mutually exclusive. Cues used to rate one dimension (e.g., **Hostility**), may also be used to code other dimensions (e.g., **Lecture/Moralize**). (See Appendix D).

W. **Related and restricted scales**: In general, each scale is rated independently from all other scales. However, please note the following exceptions:

1. Required relationship:

   a. Scores of '2' or higher on **Hostility** necessitate a score of at least a '2' on **Antisocial**.

2. Restricted relationships:

   a. It is not possible to rate a focal high on both **Consistent Discipline** and **Inconsistent Discipline**. If one scale is scored a '7, '8' or a '9', the other scale cannot be scored above a '6'.

   e. *It is not possible to rate a parent high on both **Intrusive** and **Sensitive/Child-Centered**. If one scale is scored a '7', '8', or '9', the other scale cannot be scored above a '6'.*

> f. *It is not possible to rate a young child high on both **Compliance** and **Defiance**. If one scale is scored a '7', '8', or '9', the other scale cannot be scored above a '6'.*

STRATEGIES FOR VIEWING TASKS

A. A task <u>begins</u> when the video interviewer finishes instructions and leaves the room. *In activity-based tasks, the task begins once the interviewer finishes the instructions and participants start working on the puzzle.* A discussion based task <u>ends</u> when the interviewer <u>returns</u>. *An activity-based task ends when parent indicates task completion or the interviewer returns, whichever occurs last.*

B. First, watch the assigned task for a selected family one time through without stopping the tape for a <u>general overview</u> of relationships and behaviors.

C. The coder should switch off between coding the parent first and coding the child first. That is, if on the last tape the coder chose to code the parent first, then the coder should code the child first on the next tape.

D. Observe each focal twice. The first time rate as many scales as possible; the second time rate the remaining scales and check for accuracy on the first scales rated. Record scores for behaviors for one focal before viewing and scoring the next focal.

E. Record on note sheets the cues (statements or actions) which indicate the presence of a behavior. Supply enough "evidence" (e.g., transcribed comments, behaviors, times, etc.) to justify your score. These written "cues" will help you make decisions based on observed behavioral cues, as well as help facilitate group training sessions.

F. Since your first scores will be the most ambiguous, you may find that you will want to go back and modify scores for the first focal (or others) after you have observed the task several times. This is acceptable, but be sure changes are based on concrete evidence. Make final score decisions based on overall evidence regarding each scale.

G. Interruptions in a task: Code interaction occurring between participants even if one is absent for a time because of an interruption such as a phone call. Code verbal and nonverbal behaviors between persons participating in the task, even if persons or events outside the task have influenced the comments.

H. The primary and reliability observers <u>should not discuss a tape</u> until the coding on that tape or task is complete. When questions about coding arise, please follow procedures for discussing these with a person designated to answer questions. It is important that questions be discussed, but we also need to be able to indicate that the data have been independently coded.

I.   When a tape is unusual for reasons such as length, quality, questions, etc., call it to the attention of a supervisor.

CODING PARENTING SCALES USING OBSERVATION AND REPORT

A.   In rating Parenting Scales you may use reports of events <u>outside</u> the interaction. Take into account statements made during the interaction which describe behavior by parents toward child that you did not actually observe during the interaction task. For example, family discussions about rules, behavioral expectations for the child at home and at school, and parental disciplinary practices may allow you to infer the level of scoring for some parental behavior in general. Be sure to score based on actual evidence (observed or reported) and not on assumptions about behavior. *When coding activity- based tasks, score primarily on behavior observed during task rather than on reports of parental behavior.*

B.   When scoring based on inference from reports of behavior, score lower if in doubt.

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C.   Scores for Parenting Scales must be based on observed and/or reported behaviors (i.e., from reports by adults and/or children). Do not score parenting behaviors based upon what <u>you think</u> probably occurs if you have no observed or reported evidence to support your score.

D.   *Base scores for parents of young children in activity-based tasks primarily on behavior observed during the interaction task. Also consider the proportion of time spent engaging in various tasks. The length of activity-based tasks is very short compared to discussion-based tasks.*

ADAPTATION TO CODING BEHAVIORS OF YOUNG CHILDREN

A.   *Young children should be scored using the same basic guidelines and definitions as for other-age focals.*

B.   *The behavioral indicators displayed by young children may appear in more rudimentary forms, but still fall within the overall definition for specific scale categories.*

C.   *Information particularly relevant for scoring young children's behaviors appears in italicized type.*

D.   *In activity-based tasks (e.g., puzzle completion, clean-up, etc.), pay particular attention to nonverbal cues from both parents and children.*

GENERAL GUIDELINES FOR OBSERVING AFFECT*

This behavioral rating scheme places strong emphasis on the role of emotional affect in determining scales and scale levels. Affect refers to the way a message is conveyed (e.g., vocal tone and emotional expression) vs. the verbal content of the message. When rating the focal's display of emotional affect, pay particular attention to three channels of communication: facial expression, voice, and body posture (e.g., position of head, arms and legs).

1. **Facial Expression**: The facial channel of affect includes several areas of special importance: brow, eyebrows, eyes, cheeks, and mouth. In observing the person's brow, check to see if the brow is furrowed. A furrowed or lined brow may be indicative of such emotions as puzzlement, fear, anger, or pain. Deciding which scale or scale level to use in such cases depends upon other nonverbal information. The eyebrows are especially informative. A major feature of dysphoric affect is raising the inner part of the eyebrows while the rest of the eyebrow is neutral. If the inner part of the eyebrows are drawn tightly together, you should consider coding aversive affect or pain affect. If the eyebrows are raised, the emotion communicated is often surprise, either positive or negative, or perhaps fear and anxiety. When looking at the eyes of the focal, take care to note if the person is paying attention to others with whom he/she is interacting, e.g., the focal maintains eye contact with his mother, the focal looks away from her husband, the target closes his/her eyes when speaking or listening (could mean that the person is tired or could mean that he/she is avoiding interacting, avoiding eye-contact with the other person). Make sure that you pay attention to a person's cheeks for signs of tension, fatigue, and especially for dimples caused by smiling or frowning. In choosing between different affect codes, it may be useful to examine the subject's mouth. Are the corners of the mouth turned up? Are they turned down? Are the lips visible? Sometimes when the person is very angry, the upper lip may disappear or become very thin, especially when coupled with intensity of gaze and punctuated verbal statements. Are the lips tense or relaxed? Be aware that a smile does not always involve upturned corners.

2. **Voice**: The second major indicator of affect is the voice. Particularly important in evaluating voice is voice tone and word emphasis. It makes a large difference where the emphasis or stress is on certain words. For example, a wife might say to her husband, "I would appreciate it if you would pick up around the house more." The same words stressed differently would have a different meaning, e.g., "I would appreciate it if you would pick up around the house more." The first phrasing indicates that the wife is negotiating with her husband and wants to stress that one of the things she would like her husband to do is pick up more around the house. The second sentence stresses the wife's anger that her husband does not pick up around the house like he should; even though the phrase is outwardly polite, the stress on "appreciate" indicates that the wife is not negotiating, but is angry. Also pay close attention to the tone of voice -- is it hostile? Sarcastic? Bitter? Pleased? Angry? Is the voice volume high or low?

    Please be aware that voice tone or volume may not mean the same thing from person to person or from family to family. For example, low voice volume usually indicates shame, sadness, or

withdrawal, but in some persons, it may be a way of suppressing or even expressing anger or hostility. Other people may simply be soft-spoken.

Also, consider the <u>pacing of the speech</u>. When the person speaks, does he/she speak fluidly, smoothly, or are there gaps of time between the words? Does the person sound hesitant, reluctant to speak? Does he/she sound animated? Just as with voice volume, pace of speech will vary by individual. Depressed persons may have especially low voice volume and slow pace of speech, but low volume and slow pace could also be indicative of thoughtfulness, or even a signal of respect to the recipient.

3. **Body Posture**: The last major indicator of affect is body posture. Does the positioning of the body indicate interest? Boredom? Are the person's movements animated or lethargic? Pay particular attention to gestures, mouth movements (like smiling or frowning), and body positioning. Scan the hands and shoulders for indications of tension, anger, etc. Often the focal may be speaking in a calm, reasoning way, but the tension in his/her fists or shoulders reveals that there is more emotion being communicated than just through content. It may be particularly helpful to pay attention to the mouth. Are the person's movements intimidating? Threatening? Does the subject cower and hang his/her head? Does the subject make small repetitive, rapid movements of foot or eyes? All of these behaviors are indicators of various affective states. Paying close attention to them may increase your ability to make a decision regarding affect. Some of the specific affect cues may be found in several of the affect code definitions. It is important to look at the combined impact of all cues to determine the appropriate affect code (e.g., a loud and rapid voice may indicate either happiness or aversiveness; a soft voice may be caring or dysphoric).

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4. **In ALL judgments of affect**: Do not rely upon only one cue such as raised eyebrows; rather, rely upon the combination of all affect cues to determine what the person's displayed emotion is. For example, in the case where one person is closing his/her eyes while communicating, it is important to note other elements of that person's nonverbal behavior and tone of voice. If the focal also rubs his/her eyes, sounds weary with a low voice tone, and has a body posture indicative of fatigue, then make the judgment that he/she is tired rather than he/she is fearful, irritated or avoiding interaction.

INDIVIDUAL CHARACTERISTIC SCALES

Individual Characteristic Scales describe the general mood or state of being of a person regardless of with whom that person is interacting in the task.

POSITIVE MOOD (PM)

Rate: All (Individual Characteristic)

This scale measures the degree to which the focal appears content, happy, and optimistic and/or demonstrates positive behavior toward self, others or things in general. Take into account: nonverbal communication, such as facial expression and body posture; emotional expression, such as smiling, laughing, and being involved positively in the interaction; and the content of statements themselves. Overall, rate the extent to which the focal conveys a positive attitude and how positive the focal seems to feel about elf and life in general. *Pay particular attention to nonverbal behaviors when scoring this scale for young children.*

1 = Not at all characteristic:
The focal displays <u>no examples</u> or no firm evidence of **Positive Mood**. The focal does not express feelings, either verbally or nonverbally, of optimism, contentment, or happiness.

2 =

3 = Minimally characteristic:
The focal <u>rarely</u> demonstrates signs of **Positive Mood**, such as a smile, a laugh or a low-intensity comment, e.g., "I like ice cream." Such expressions, verbally or nonverbally, are infrequent and of low intensity.

4 =

5 = Somewhat characteristic:
The focal <u>sometimes</u> behaves, verbally or nonverbally, in a manner reflecting **Positive Mood**. He/she may smile, laugh and make positive statements about others, outside situations, or self. Note the frequency and intensity of positive mood behaviors to determine the score. Infrequent indications of **Positive Mood** that are moderately intense, e.g., "I feel really good these days," would be rated '5'.

6 =

7 = Moderately characteristic:
The focal <u>fairly often</u> expresses positive feelings of contentment and happiness. Behaviors such as laughing, smiling, making positive statements about self and others occur fairly frequently or occur with greater intensity. Infrequent, but quite intense statements *(e.g., "I feel just wonderful these days") or behaviors (e.g., gleeful exuberance, jumping up and down, clapping hands)* would be scored '7'.

8 =

9 = Mainly characteristic:
The focal <u>frequently</u> demonstrates **Positive Mood**. He/She is happy, optimistic, content, positive about self and life in general. In <u>atypical</u> situations, the focal may not be positive throughout the interaction but <u>may make one or two very intense positive statements</u> that

could be scored a '9'. For example, a statement such as "My life is just wonderful, it couldn't be better," said with sincerity and enthusiasm would be scored
'9'.

Clarifications: **Positive Mood**

1. This scale assesses the focal's **Positive Mood** regarding him/herself, the situation, or life in general.

2. Look for an <u>overall general positive or upbeat mood</u> even if it relates only to the situation and the people in the task, but not to anything outside the immediate setting. This is especially important in activity-based tasks with young children.

3. Code on the presence of something you observe: facial expressions, body posture, content of statements. *Pay particular attention to these behaviors in young children.*

4. **Warmth/Support** is part of **Positive Mood**, but **Positive Mood** includes other things such as statements about life and self in general. If the general sense is that the **Warmth/Support**, **Humor/Laugh**, etc., directed toward someone else <u>also</u> reflect the focal's generally positive mood, code also under **Positive Mood** (e.g., "You're beautiful" is coded as **Warmth/Support** and **Positive Mood**. "You are a fun person to be with; I enjoy being with you" is coded as **Warmth/Support** <u>and</u> **Positive Mood**. However, "I understand that you are going through a difficult time" is **Warmth/Support** but <u>not</u> **Positive Mood**). In general, it is the supportive statements that are a part of **Warmth/Support** that may not also be **Positive Mood**.

5. If there is no evidence or very low-level indicators of **Positive Mood**, the focal would score a '1' or '2'; however, this would <u>not</u> necessarily indicate elevated **Sadness, Anxiety,** or **Externalized Negative** -- just the absence of expressions of **Positive Mood**.

6. A focal may display **Positive Mood** through his/her facial expression (e.g., smiling), tone of voice (e.g., high pitch, fast pace), or body language (e.g., clapping hands in excitement).

7. On rare occasion, sarcasm that is light-hearted in nature (i.e., is not aversive) may be an indicator of
    Positive Mood if it reflects contentment and satisfaction with self, others, or life in general.

8. Words that describe **Positive Mood** include:

amused	elevated	glad	pleased
animated	*energetic*	*gleeful* optimistic buoyant	enthusiastic
happy	satisfied content with life	*excited joyous*	thrilled
content with self	exuberant	light-hearted	up delighted funny
playful			

9. <u>Listen</u> for the following possible indicators of **Positive Mood** (these must be combined with other **Positive Mood** indicators):

     a.   high pitched, excited, or sing-song voice

     b.   talking that is faster or louder than usual

     c.   laughter or giggling

10.   <u>Watch </u>for the following possible nonverbal indicators of **Positive Mood**:

     a.   smiling

     b.   laughing/*squealing*

     c.   positively involved with interaction

     d.   exaggerated, expansive, or animated expressions and/or gestures

     e.   "relaxed" body posture

     f.   *jumping up and down*

     g.   *high activity level*

     h.   *hugging*

11.   In general, score **Positive Mood** based on a combination of nonverbal and verbal behaviors that occur simultaneously or in close proximity. Thus, it is unlikely that a single smile or laugh would warrant scoring above a '1' on this scale.

12.   Do not code antisocial horsing around, enjoyment of obnoxious behavior or bragging at someone else's expense as **Positive Mood**.

<u>Examples</u>: Positive Mood

1.   "I'm content with my life."
2.   "I did a good job at school."
3.   "The teachers like me."
4.   "The members of my track team are great."
5.   "John is a good friend."
6.   "I can handle that situation."
7.   "Things couldn't be better."
8.   "We have wonderful children."
9.   "You're beautiful." (**Warmth/Support** and **Positive Mood**)
10.   "You are a fun person to be with; I enjoy being with you." (**Warmth/Support** and **Positive Mood**)
11.   *"I love you, Mommy." (**Warmth/Support** and **Positive Mood**)*
12.   *"This is fun!"*
13.   *"I'm good at puzzles."*
14.   *"I want to do it again."*
15.   *"We can do this!"*

<u>Non-examples</u>: Positive Mood

1.   "I understand that you are going through a difficult time." (**Warmth/Support** only)
2.   "It is too ad that you broke your arm. How can I help?" (**Warmth/Support** only)
3.   "He thought he was the best – but I really showed him up last time."

DYADIC INTERACTION SCALES

Dyadic Interaction Scales are scales designed to assess the behavior directed by one person toward another person in an interaction context.

HOSTILITY (HS)

Rate: All (Dyadic Interaction)

This scale measures the degree to which the focal displays hostile, angry, critical, disapproving and/or rejecting behavior toward another interactor's behavior (actions), appearance, or state. Take the following behaviors into account: NONVERBAL COMMUNICATION, such as angry or contemptuous facial expressions and menacing/threatening body posture; EMOTIONAL EXPRESSION, such as irritable, sarcastic, or curt tones of voice or shouting; rejection such as actively ignoring the other, showing contempt or disgust for the other or the other's behavior, denying the other's needs; and the CONTENT of the statements themselves, such as complaints about the other or denigrating or critical remarks, e.g., "You don't know anything" or "You could never manage that." Bear in mind that two people can disagree without being hostile. To be hostile, disagreements must include some element of negative affect such as derogation, disapproval, blame, ridicule, etc. *Young children may express hostility through negative or physically aggressive behaviors directed toward the other person (e.g., yelling, kicking, hitting, or throwing objects).*

1 = Not at all characteristic:
The focal displays no examples of hostile, angry, critical, disapproving, sarcastic or rejecting behavior, *or hostile actions.*

2 =

3 = Minimally characteristic:
The focal infrequently displays evidence of low-intensity hostility, but it is quickly abated. Examples of low- intensity hostility are mild criticism with minimal negative affect, an occasional abrupt remark, a scowl or frown, a cynical smile, and in children particularly, a taunt or tease. *Physical behaviors include an occasional light push or shove.*

4 =

5 = Somewhat characteristic:
The focal sometimes displays examples of low-level or moderately intense hostility, such as curt or irritable responses, mild rejection, or some moderately intense criticism or anger. The intensity of the negative affect helps to distinguish the appropriate score; includes infrequent but moderately intense hostility. *Young children who respond to parental behaviors with moderately irritable or angry behaviors would also be scored at this level.*

6 =

7 = Moderately characteristic:
The focal fairly often shows hostility or demonstrates more intense and/or prolonged critical comments, such as some shouting, and several curt or sarcastic remarks. The focal may also show more intense rejection or rebuffing of the other person's requests for assistance or affection. The focal may also show more denigration or mocking. Even a single instance of hostility may be scored '7' if it is of relatively high intensity. *Evidence of hostility includes yelling and/or physically aggressive behaviors toward the other focal.*

8 =

9 = Mainly characteristic:

The focal <u>frequently</u> displays behaviors that are angry, critical, disapproving, and/or rejecting. There may be a relatively high degree of shouting, angry tones of voice, heavy use of sarcasm to denigrate the other, sharp or frequent criticism or mocking. The focal may be highly rejecting *and rebuff parental attempts at contact (i.e., young children)*. The focal can be enraged and inflamed, but does not need to be this extreme in order to be coded a '9'. One extremely intense instance of hostility, e.g., a burst of inflamed name calling, *or a burst of physically aggressive behaviors toward the other person*, may be scored '9'.

<u>**Clarifications**</u>: **Hostility**

1.   This scale is NOT an assessment of the general amount of hostility generated BETWEEN two people.

2.   This scale IS an assessment of the degree of hostility directed BY one person TOWARD the actions, behavior, appearance, or state of another.

3.   Include as **Hostility** direct statements of a specific or nonspecific nature that convey a negative evaluation of another interactor; also include unqualified personalized attacks, criticisms, name calling and specific humiliation of the recipient.

4.   Hits and pokes are forms of **Hostility**. Include low-grade aversive physical contact that is not delivered with disruptive force as well as more extreme behaviors. The <u>intensity</u>, as well as the <u>frequency</u>, of aversive contact behaviors should be considered in deciding how to score **Hostility** based on these contacts.

5.   Grooming another interactor is not **Hostility** unless the grooming is harsh or irritating.

6.   Hostile comments may be related to the past, present or future and need NOT be delivered in an irritated or angry tone of voice.

7.   **Hostility** may be displayed through some combination of the following behaviors. In the absence of any one of these categories, LOOK TO THE ONES THAT ARE PRESENT.

    a.   Nonverbal Communication:

        (1)   facial gestures (e.g., scowling, frowning, disgust, disdain)
        (2)   body posture (e.g., hands on hips, grabbing something from the other in a rough manner, shaking a finger at the other, turning away from the other in anger, rejecting physical advances of the other)
        (3)   actions directed toward the other person (e.g., hitting, kicking, throwing objects).

     b.   Emotional Expression:

          (1)   enraged
          (2)   irritable
          (3)   negative sarcasm
          (4)   tense
          (5)   curt, sharp, sneering tone of voice
          (6)   scorn/contempt
          (7)   disgust
          (8)   actively ignores the other
          (9)   exasperation

     c.   Content of Statement:

          (1)   denies the other's needs and concerns
          (2)   mocks the other
          (3)   critical statements
          (4)   accusations regarding actions or behavior of another
          (5)   agreeing with another interactor's hostility
          (6)   put-down
          (7)   character assassination, insult
          (8)   complaints
          (9)   carping
          (10)   pokes fun at another's expense
          (11)   demeaning statements about the other

8.   When coding teasing, determine the score based on affect. It may be **Hostility.**

9.   **Hostility** may take the form of anger/irritation (engaged and hot), as well as the form of disgust/scorn/contempt (distant, icy, cold).

10.   Do not count reports of negative behavior unless there is criticism conveyed by words or affect. Interactors may simply report answers to questions without these being hostile. Count as **Hostility** if the words themselves are hostile, if the focal goes on and on, or if the affect is hostile.

11.   If sarcasm is stated in a way that is accepted positively (smiling, laughing) or with a sarcastic retort by the other focal, then it may be counted as **Warmth** and not **Hostility**. Consider whether the comments lighten the atmosphere or if the other focal thinks it is funny. Sarcastic exchanges can be counted as **Warmth** rather than **Hostility** as long as the tone stays positive. Sarcasm is hostile if it is received by the other with a negative (hostile, sad, or anxious) response.

Examples: Hostility
1.   "Shut up, Mom. She's asking me."

2. "You never go to bed when Dad asks you to."
3. "You don't do all that; you spend money on stupid stuff."
4. "You yell too much. You always come on like a raging bull!"
5. "That's all I do, is listen!"
6. "I catch all the problems you've had all day."
7. "You didn't do as you were told, did you?"
8. "You're just plain wrong about that!"
9. "This place is a mess."
10. "You flunked your math test, didn't you?"
11. "You're being a pest."
12. "He's such a big pest" followed by rolling eyes and a short, exasperated sigh (said about the son to the mother in the son's presence).
13. "I hate it when you take the last one and don't replace it."
14. "I'm sick of the way she treats the dog." (said about the daughter to the father in the daughter's presence).
15. "You really are a drip."
16. "I hate you."
17. "I don't like you."
18. "You sure are ugly."
19. "You really are a jerk."
20. "You'll never amount to anything."
21. "You always do it wrong."
22. "Slob!"
23. "Krista, you're a dummy."
24. "You're so mean, I hate you."
25. "You yell all the time."
26. Hitting, kicking, or throwing objects at the other person.
27. Making faces at someone.
28. *Rebuffing parental teaching attempts.*

<u>Non-examples</u>: Hostility
1. "That friend of yours looks like a slob." (**Externalized Negative**)
2. "I feel awful." (**Sadness**)
3. "He never lets me go anywhere." (**Sadness**)
4. "He got a low grade this semester." (said without critical affect)
5. "Sometimes you don't get it right the first time." (reported without negative tone)
6. "You and your brother fight quite often." (said in descriptive manner)
7. *Throwing object, but not at other person. (**Antisocial**, possibly **Externalized Negative**)*

LECTURE/MORALIZE (LM)

Rate: Parent (Dyadic Interaction)

This scale measures the degree to which the focal presents information in a didactic, superior-wisdom manner that may be lectury, preachy, intrusive, pushy, and/or moralizing. Rather than discuss issues, the focal may simply lecture other participants and/or tell them how things really are or should be. The focal may interrupt others or may not give them a chance to respond, initiate, or think independently. At lower levels, a focal may provide short discourses on topics, present maxims, and/or state truisms. A high score indicates that the focal engages in extended monologues concerning the way things should or shouldn't be, how people should or shouldn't act, morality lessons from his/her own experiences, and/or advice based on his/her superior insight. A focal may also receive a high score by exhibiting frequent brief examples of these behaviors. At any scale level, the affective quality may be positive, negative, or neutral.

1 =   Not at all characteristic:
  None of these behaviors is demonstrated by the focal.

2 =

3 =   Minimally characteristic:
  The focal rarely shows evidence of lecturing or moralizing behaviors. These behaviors are brief, infrequent, and of low intensity.

4 =

5 =   Somewhat characteristic:
  The focal sometimes displays lecturing behavior at a low to moderate level. The difference between this category and a '3' is that the lecturing behaviors are of somewhat longer duration, more frequent, and/or more intense.

6 =

7 = Moderately characteristic:
  The focal fairly often displays lecturing behaviors. Such behaviors may be more intense and prolonged. The focal may be more intrusive and may lecture or moralize to the point of making it difficult for others to express their views.

8 =

9 = Mainly characteristic:
  The focal frequently displays lecturing behaviors, or such behaviors become more extended and unrelenting. He/she may seldom give the other interactor a chance to respond and tends to monopolize the discussion. Two-way communication may be actively inhibited.

<u>Clarifications</u>: Lecture/Moralize

1. **Lecture/Moralize** may be indicated by the presence of <u>interrupting</u>, particularly by interruptions that are overwhelming, are complaining in nature, or do not allow the other person to think for him/her self. Interruptions are particularly likely to indicate **Lecture**/**Moralize** if they reduce, rather than increase, discussion in the family.

2. <u>Interrupting </u>followed by "should" or "ought" statements, even though not negative in emotional affect, may indicate **Lecture/Moralize**. If there is some sense of denigrating the other, score also as **Hostility**.

3. **Lecture/Moralize** often conveys beliefs and opinions in a lecturing, annoying manner, but also can be delivered more neutrally or even positively. In rare cases a **Lecture/Moralize** statement may be delivered with neutral or positive affect and an open body stance.

4. To differentiate between **Lecture/Moralize** and **Communication**, consider the manner in which information, opinions, etc., are shared. If the focal is engaged in an extended monologue rather than in discussing issues in the form of open exchange, score under **Lecture/Moralize**. **Lecture/Moralize** is characterized as a monologue, whereas **Communication** involves a dialogue between two people.

5. In general, a statement cannot be coded as both **Lecture/Moralize** (closes dialogue) and **Communication** (invites dialogue). In rare cases, if presented with positive affect, **Lecture/Moralize** sometimes may count as **Communication**, but only at a low level (i.e., no higher than '3'). It is more usual that these behaviors may occur in close proximity, but not simultaneously.

6. Low scores on **Lecture/Moralize** <u>may </u>be associated with the presence of higher scores on **Communication**. High levels of **Hostility** may accompany high scores on **Lecture/Moralize**.

7. Because **Lecture/Moralize** involves stating laws, rules, or moral beliefs, this behavior may contain an element of guilt induction. Statements that appear to be designed to make the other interactor feel guilty or feel pity for the focal (i.e., "You should feel ashamed of yourself for always forgetting to come and see me").

8. Parents can turn an interaction into a soap-box lecture by <u>telling </u>the child all he/she does wrong or should be doing or by extolling the virtues of getting good grades or how life for the parent was as a child.

9. Lecturing to the camera is **Lecture/Moralize** to each of the other interactors.

10. Score **Lecture/Moralize** if the focal uses <u>preachy</u> "should," "ought" statements, even if short. Such statements convey the sense that "I'm the expert, let me tell you how things really work," and/or "I'm telling you this for your own good." They close off rather than invite dialogue.

11. Take care not to score **Lecture/Moralize** in adult-adult interactions when a focal shares opinions and thoughts in a conversational manner. Although conversations may be more prolonged, if content and delivery are not presented in a lectury manner,
they would not be scored **Lecture/Moralize** (either in tone or content).

12. Synonyms for **Lecture/Moralize**

adage	didactic	platitude
admonish*	instruct	preach
advise caution	maxim moralize	rebuke*
chide* counsel	oration pearl of	sermonize
	wisdom	soap-box
		truism

*Note: These are synonyms for lectures presented with negative affect.

Examples: Lecture/Moralize
1. "You should know better..."
2. "Don't you think it's about time you start doing..."
3. "You should be ashamed of yourself for breaking your promise."
4. "Shame on you - you should know better."
5. "I'd expect more of you."
6. "When I was a kid..."
7. "Drugs are really bad. They are ruining our country. I hope you never use drugs."
8. "It is important that kids get their homework done as soon as they come home from school. Kids need to be more responsible for getting homework done on their own. They shouldn't have to wait for their parents to remind them."
9. "People need to be more caring. There are too many self-centered people in this world."
10. *"She said to do it together."*
11. *"You have to help me."*
12. *"You do it - you're the mom."*
13. *"We have to put those away now. It's time to clean up."*

Non-examples: Lecture/Moralize
1. "No one ever listens to me."
2. "Stop that right now!"
3. "I'm pleased with the way you assume responsibility for yourself." (**Warmth/Support**)

WARMTH/SUPPORT (WM)

Rate: All (Dyadic Interaction)

This scale measures the degree to which the focal expresses liking, appreciation, praise, care, concern, or support for the other person. Take into account three types of behavior: NONVERBAL COMMUNICATION, such as affectionate touching, kissing, and loving smiles; SUPPORTIVENESS, such as showing concern for the other's welfare, offering encouragement, and praise; and CONTENT, such as statements of affirmation, empathy, liking, appreciation, care, and concern. In general, rate how much the focal demonstrates care and support for the other. In scoring **Warmth/Support**, look for combinations of behaviors and weigh affect and nonverbal behaviors more heavily than content of statements.

1 = Not at all characteristic:
The focal displays no discernible examples of warmth or support toward the other. The focal does not go out of his/her way to be warm/supportive (interested in and affirming) of the other at any time.

2 =

3 = Minimally characteristic:
The focal exhibits some evidence of low-intensity behaviors that demonstrate warm/supportive caring, concern, and encouragement toward the other, but these behaviors quickly disappear. Examples of low- intensity **Warmth/Support** are: encouraging comment or interested question, or an understanding look with a smile, etc., that are genuinely warm/supportive. Simply attending does not warrant a '2' or '3' unless accompanied by warmth such as an affectionate smile or empathic expression, or some other indication of **Warmth/Support**.

4 =

5 = Somewhat characteristic:
There are several times when the focal expresses a moderate degree of concern, warmth, support, encouragement, praise, or affection or attempts to draw out the other person in a warm/supportive manner. There is some clear evidence that the focal occasionally is trying, for example, to praise, affirm, empathize with, or in some other manner demonstrate **Warmth/Support** to the other.

6 =

7 = Moderately characteristic:
The focal fairly often shows warmth and support or demonstrates more intense warmth and support. The focal may express interest in and attend to the other's comments in a warm/supportive manner. The focal shows positive nonverbal gestures, such as warm smiles, and/or occasional affectionate touching. The focal fairly often attempts, for example, to praise, affirm, empathize with, or in some other manner demonstrate **Warmth/Support** to the other.

8 =

9 = Mainly characteristic:

The focal is characterized as being <u>highly warm and/or supportive</u>. The focal frequently may show high warmth and support by offering a high degree of encouragement and praise, and/or the focal may display a high degree of affectionate touching, warm smiling, and/or positive comments about the other. He/she may actively elicit information about the other's concerns in a warm/supportive, interested manner. The focal displays genuine interest in and affirmation of the other.

<u>**Clarifications**</u>: **Warmth/Support**

1. **Warmth/Support** may be displayed through some <u>combination</u> of the following behaviors in such a manner that conveys genuine interest in and affirmation of the other person:

   a. Nonverbal communication:

      (1) physical affection - caresses, hugs, kisses, gentle touches, light tickling
      (2) physical gestures - warm smiles, winks, thumbs up sign, O.K. sign,
      (3) body posture - tilting head toward other, leaning closer toward other
      (4) eye contact - gazing affectionately into the other's eyes, eye contact that connects and lingers with the other
      (5) facial expressions - displays of sympathy, understanding, encouragement, approval, etc.

   b. Supportiveness:

      (1) shows interest in the other's welfare
      (2) shows interest in the other's concerns
      (3) willingly changes own behavior for the other
      (4) offers encouraging comments and praise
      (5) empathetic
      (6) expresses warmth, concern, sympathy toward the other person
      (7) encourages other person
      (8) flatters, compliments other person
      (9) minimizes other person's self-deprecatory statements
      (10) reassures the other

   c. Content:

      (1) affirmation
      (2) praise
      (3) encouragement
      (4) approval
      (5) validation

(6)   empathy

(7)   support

(8)   gratitude

(9)   appreciation

2.   The focal who scores high in **Warmth/Support** is generally positive and affirming and indicates a high level of support and/or understanding of another person's feelings or emotions. *Young children who score high on **Warmth/Support** are generally affectionate and warm toward parent.*

3.   It is important to note that **Warmth/Support** can be expressed by a variety of behaviors, some of which are assessed by other scales, i.e., **Communication** and **Positive Mood**. Consider the general nature of the **Warmth/Support** scale when rating, and REMEMBER THAT IT IS OKAY THAT THERE IS SOME OVERLAP.

4.   Include verbal expressions of approval of the other interactor's appearance, behavior, or state, as well as verbal expressions of support, empathy, apology, and thanks that convey warmth to the other person versus merely **Prosocial** comments.

5.   Code **Warmth/Support** when the focal is conveying warmth, affection, supportiveness, and liking for the other person. It may be coded when the focal is talking or acting in a soothing or empathetic manner as well as when the subject is showing that he/she cares about or feels close to the other person. Teasing that is of an affectionate nature would be coded as **Warmth/Support**.

6.   Words that describe **Warmth/Support** include:

admiring caring helpful adoring comforting loving

affectionate concerned supportive affirmation empathetic tender

appreciate endearing understanding approving endorsing validation

Note: These behaviors must be displayed in a warm manner (i.e., affective tone and nonverbal cues are warm).

7.   Expressions of interest, support and encouragement presented in a soft, warm, and/or soothing voice would be coded **Warmth/Support**.

8.   Agreement in and of itself does not necessarily indicate warmth or support. Likewise, coalitions or shared opinions are not automatically **Warmth/Support**. The manner in which agreement is expressed must be warm and supportive of the other interactor in order to count as evidence of **Warmth/Support**.

9. "We statements" can be counted as **Warmth/Support** as long as there is evidence of **Warmth/Support** and positive affect. For example, "We enjoy going on picnics together", "We're best friends", *or "We did it!".*

10. Comments about the past can be counted as **Warmth/Support** if stated in a warm manner. For example, "You were fun to be with when we went out to eat."

11. Global statements of affirmation would count as **Warmth/Support**.

12. Affectionate touches are a specific form of **Warmth/Support**.

13. Neutral touches such as touches that are not clearly either warm/supportive or hostile/invasive/irritating, may be uncodeable.

14. If two people laugh at the same time, **Warmth/Support** should be coded <u>only</u> if it is clear that the laughter conveys a sense of caring, interest, and support for the other person.

15. **Warmth/Support** may include positive name calling which is complimentary in context or pet names signifying affection. In determining whether or not positive name calling or pet names should be coded as **Warmth/Support**, pay attention to context and manner (i.e., mindless versus more deliberate).

16. **Warmth/Support** can be coded for comments made in the third person about someone who is present. For example, a parent says to the other parent or to the camera, "He is a good student." However, the rating would not be as high as when made directly to the person ("You are a good student").

17. If people sit with arms or shoulders touching, code as **Warmth/Support** only if contextual cues indicate this touching appears intentional or it is accompanied by other cues, for example a warm comment or smile. Score based on instances of observable **Warmth/Support**, not on length of physical contact.

18. Gestures such as "high-fives" and "gimme-fives" must be looked at contextually. If offered in a supportive "good job," sort of manner and the other interactor returns the high-five, code as **Warmth/Support** for both participants. However, if the high-five is more of a boasting or bragging type of behavior, do not code as **Warmth/Support**. Pay specific attention to the context.

19. Only score **Warmth/Support** for behaviors of the focal that convey or give warmth and/or supportiveness, not for behaviors that seek warmth and/or supportiveness.

<u>Examples</u>: Warmth/Support
1. "We're really pleased with your grades."
2. "You've done a good job with all your chores."

3. "I know it's difficult; you have to work really long hours."
4. "I know you'll do better next time."
5. "Why do you feel that way?" "What could I do to help you?"
6. "I could come home earlier and start supper."
7. "Yes, it was a tough situation; you handled it really well."
8. "I like your drawing."
9. "Thanks for your help."
10. "Sorry about that."
11. "That must have hurt." (the recipient had been hurt)
12. "You're really smart." (**Warmth/Support**)
13. "I love you."
14. "I really care about you."
15. "You have too much to do. Let me do the dishes."
16. "You're wonderful." (**Warmth/Support**)
17. "You're terrific." (**Warmth/Support**)
18. "You are really smart." (**Warmth/Support**)
19. "Gee, you're beautiful." (**Warmth/Support**)
20. "You're so handsome." (**Warmth/Support**)
21. "You're one of the most thoughtful people I know." (**Warmth/Support**)
22. "You were very brave."
23. "Hello, beautiful. (**Warmth/Support**)
24. "I'm proud of how well you two do in school."
25. "We're proud of how well you handle things when we're gone."
26. "You're easy to raise." (**Warmth/Support**)
27. "Dad's really funny." (said if Dad is in the interaction)
28. "That was a nice job."
29. "You look great in that shirt."
30. "That was a smart move on your part."
31. "You did that well."
32. "I'm really proud of you." 33. Hugs. (**Warmth/Support**)
34. Holding hands.
35. Stroking head, arm, back, etc.
36. Touching arm in a tender manner.
37. Touching shoulders with other interactor.
38. "Thanks!" (with warm affect and gaze).
39. *"You're really good at this !"*
40. *"You're doing such a good job."*
41. *"Good!"*
42. *"I like doing this puzzle with you."*

Non-examples: Warmth/Support
1. "Yes, your uncle is the best carpenter I know." (**Communication** and **Positive Mood**)
2. "Isn't this great weather we're having!" (**Positive Mood**)
3. "Thanks." (acknowledging the other's warmth/support or prosocial behaviors)

4. Seeking reassurance from the other interactor (verbally or nonverbally).
5. *"I like doing this puzzle."* ***(Positive Mood)***
6. *"This is fun."* ***(Positive Mood)***

LISTENER RESPONSIVENESS (LR)**

Rate: All (Dyadic Interaction)

This scale measures the behavior of the focal as a listener. It assesses the degree to which the focal attends to, shows interest in, acknowledges, and validates the verbalizations of the other person (the speaker) through the use of nonverbal backchannels and verbal assents. A responsive listener is oriented to the speaker and makes the speaker feel that he/she is being listened to rather than feeling like he/she is talking to a blank wall. The listener conveys to the speaker that he/she is interested in what the speaker has to say. *In activitybased tasks with young children pay particular attention to where the action is taking place (talking or doing) and how attentive the focal is to this. Look for behaviors that validate, reinforce, etc., the speaker (actor). Just "tracking" is not sufficient; the behavior must be validating.*

1 = Not at all characteristic:
> The focal <u>never or rarely</u> is oriented to the speaker; looking down or away (e.g., looking around the room, looking at one's lap, staring at the wall, *wandering around the room)*. Alternatively, any looks that are present do not validate the speaker.

2 =

3 = Minimally characteristic:
> The focal <u>sometimes</u> is responsive, attentive, and oriented to the speaker. These behaviors are more absent than present.

4 =

5 = Somewhat characteristic:
> The focal <u>intermittently</u> is responsive, attentive, and oriented to the speaker (e.g., about half the time).

6 =

7 = Moderately characteristic:
> The focal <u>fairly often</u> is responsive, attentive, and oriented to the speaker. However, some evidence of lack of responsiveness exists.

8 =

9 = Mainly characteristic:
> and assent are used.

** Note: Exception to general coding scheme described in Section H on pages 4-5 because '1' is never or rarely and '5' is the midpoint.

Clarifications: Listener Responsiveness

1. If you are deciding between two codes for **Listener Responsiveness** and **Communication,** you should code DOWN (e.g., if deciding between a '5' and '6', code '5'). For all other codes, you should code UP.

2. In coding **Listener Responsiveness**, note the gaze pattern of the focal. When the focal is actively watching (attending to or looking with interest at) the speaker most of the time, versus looking around the room or in his/her lap *or running around the room* score higher on **Listener Responsiveness**. However, to score at the highest levels ('7', '8', or '9'), additional behaviors (e.g., backchannels, assents, echoes, laughter) must also be present.

3. The presence of nonverbal backchannels indicates **Listener Responsiveness**. <u>Backchannels</u> nonverbally communicate an interest in what the speaker is saying or doing, such as a head nod that indicates "I hear you, please continue." They are like a mirror to the speaker, and their absence is like talking to a blank wall. They include: nod or tilt of head, leaning toward the speaker, smile or frown, gestures of the arms or hands, and other forms of behavior that validate the speaker. (See clarification 14).

4. Often a listener will emit an <u>assent</u> (a brief verbal response, such as "Yeah," "Uh-huh," "Mm-hmm") while the other person is speaking. The function of these responses is to <u>acknowledge</u> that the speaker's comments are being listened to <u>rather than to indicate</u> <u>explicit agreement</u> with the content of the speaker's comments. Code acknowledgment under **Listener Responsiveness**; code statements of agreement under **Communication**.

5. A score of up to a '5' may be given if someone is attentive, but not particularly active with nonverbal backchannels and verbal assents. Only attending with interest or only giving verbal assents could score no higher than a '5'. *Attending with interest involves more than merely tracking the other's comments and actions.*

6. Partial interest without full commitment as a listener is low-level **Listener Responsiveness**. Appropriate responses (e.g., brief assents, slight nod, etc.) without other behaviors (e.g., more definite assent, sure nod delivered in conjunction with sustained looking, etc.) can only reach a '2' or '3' level.

7. If the focal merely uses nonverbal assents or dissents to <u>convey information</u>, with no accompanying verbalizations, consider this as evidence of low scores on **Communication**. Consider this only secondarily as evidence of **Listener Responsiveness.**

8. Code as **Listener Responsiveness** instances when a listener <u>echoes or repeats</u> short portions of the other person's statements in a neutral tone of voice. Some echoes may be **Interrogation** more than inviting the speaker to continue talking, in which case do not code as **Listener Responsiveness**.

9. Score laughter that is in response to something the other person is saying or doing as **Listener Responsiveness** if the laughter validates the speaker.

10. Behavioral cues that indicate the presence of **Listener Responsiveness** include:

    a.   is attentive to partner while partner is speaking (high level of eye contact)
    b.   face is responsive to what partner is saying (e.g., head-nod, smile, eyebrow movements)
    c.   assents while partner is speaking
    d.   body relaxed, open (without arms akimbo or fidgeting)
    e.   body (head, shoulders, and trunk) oriented toward partner
    f.   torso leaning toward partner

11. **Listener Responsiveness** primarily assesses what the focal does while the other person is speaking, whereas **Communication** assesses what the focal does while the focal is speaking.

12. If the focal interrupts the other interactor, this may indicate a lack of **Listener Responsiveness**.

13. **Listener Responsiveness** involves behaviors that say to the speaker, "I'm paying attention; I hear what you're saying." or *"I see what you're doing."* It is not behavior that conveys specific information or particular dimensions of negative/positive emotional affect.

14. A frown may count as **Listener Responsiveness** if it indicates puzzlement or confusion (as in, "I don't understand - tell me more"), but not if it indicates disagreement.

15. Code **Listener Responsiveness** even if the other person does not see the listener's nonverbal responses but, in general, do not score as high.

16. Critical disagreement with what a person is saying (e.g., shaking head "no" or rolling eyes) is not **Listener Responsiveness** because it does not encourage the speaker to continue.

17. When the focal is fully responsive to another interactor who talks very little, determine the score based partially on proportion. The score may be moderately high, but would generally not go to the highest levels. Strongest weight needs to be given to frequency and intensity in determining the final score.

18. Base the score on the focal's responsiveness when the other interactor is sharing his/her views, opinions, etc. Do not base the score on responsiveness when the other interactor is merely reading the task cards, or when thinking of something to say.

19. Closely watching the other interactor so as to find an opportune time to interject a critical comment would not be scored as **Listener Responsiveness** because such looking does not validate the speaker. However, affirming and validating responses to the other interactor's critical statements are coded here (e.g., a father who looks at the mother and nods as she makes critical comments about the child in the child's presence).

20. *Do not score a child's compliance or cooperation with parental requests as **Listener Responsiveness**, even though the child's behaviors show he/she has heard what the parent said. This behavior is best coded under **Compliance**.*

21. This scale is an exception to the general coding scheme because '1' is never or rarely and because '5' is the midpoint.

<u>Examples</u>: Listener Responsiveness
1. A smile that says, "I like your idea."
2. A perplexed look that says, "I don't understand what you mean, tell me more."
3. Raised eyebrows that say, "Wow!" or "You're kidding."
4. Laughter in response to the other person's statements or actions.
5. A brief verbal response such as, "Yeah," or "Mm-hmm" while the other person is speaking.
6. *Looking at parent while parent makes a request.*
7. *Nodding after parent makes a request.*

<u>Non-examples</u>: Listener Responsiveness
1. A contemptuous eyeroll that says, "You're stupid."
2. A shake of the head that says, "I have my doubts about you."
3. A brief verbal response such as, "huh" or 'tsk" while the other person is speaking.
4. *Doing what parent has requested. (**Compliance**)*

COMMUNICATION (CO)**

Rate: All (Dyadic Interaction)

This scale measures the behavior of the focal as a communicator (verbal expressive skills and content of statements). It assesses the extent to which the focal conveys in a neutral or positive manner his/her needs and wants, rules and regulations, as well as clearly express information and ideas that may be useful to others. Communication entails the use of EXPLANATIONS and clarifications; the use of REASON; SOLICITING the other's views or in some way demonstrating consideration of the other's point of view; encouraging the other to explain and clarify his/her point of view; and responding reasonably and appropriately to the ongoing conversation. If all statements are hostile or coercive, code '1', even if the focal uses explanations and reasoning. *Because young children are unlikely to use explanations, high scores indicate statements that are clear, direct, and reflect awareness of the content of the other person's statements.*

1 =   Not at all characteristic:
Communication skills are almost entirely absent. The focal <u>rarely or never uses</u> reasoning, explanations, <u>and clarifications</u> to make himself/herself understood; the focal does not solicit the other's view, does not give the other appropriate feedback, and does not respond appropriately to the ongoing conversation. If all statements are hostile or coercive, code '1' (even if the focal uses explanations and reasoning).

2 =

3 =   Minimally characteristic:
<u>Poor communication predominates, but not exclusively</u>. The focal <u>occasionally </u>uses appropriate reasoning, explanations, clarifications, and/or solicitations, but verbalization may be infrequent or ineffective. Some solicitation or consideration of the other's views may be evident.

4 =

5 =   Somewhat characteristic:
The focal <u>intermittently </u>uses appropriate reasoning, explanations, and clarifications and may solicit the other's views or demonstrate in some fashion that he/she is taking the other person's views into consideration. **6 =**

7 =   Moderately characteristic:
<u>Good communication predominates but not exclusively</u>. The focal <u>fairly often </u>uses appropriate reasoning, explanations, and clarifications, as well as solicits or demonstrates consideration of the other's views, yet there may be a few instances of poor communication displayed.

8 =

9 = Mainly characteristic:

Good communication predominates. The focal frequently uses appropriate reasoning, explanations, and clarifications to make him/herself understood; the focal solicits or demonstrates consideration of the other's views and gives the other appropriate feedback.

** Note: Exception to the general coding scheme described in Section H on pages 4-5 because '1' is never or rarely and '5' is the midpoint

Clarifications: Communication

1. If you are deciding between two codes for **Communication** and **Listener Responsiveness,** you should code DOWN (e.g., if deciding between a '5' and '6', code '5'). For all other codes, you should code UP.

2. "Explanation" means the focal:

   a. seeks to tailor comments to cognitive level of the other
   b. expands upon own statements
   c. identifies own position clearly
   d. asks open-ended versus closed questions

3. "Reason" means the focal has logical comments and/or arguments that follow the other's comments.

4. "Solicitation" means the focal expresses interest in the other's views, asks the other person to explain or clarify his/her point of view, and/or asks follow-up questions. Directing a question from the task card to another interactor should not be counted as solicitation.

5. "Appropriate" means the focal's comments are related to the topic and are positive or neutral (versus hostile, defensive, blaming) in content and emotional affect.

6. If the focal merely uses nonverbal assents or dissents to convey information, with no accompanying verbalizations, consider this as evidence of a low score on **Communication**.

7. Do not confuse the presence of a high amount of talking or evidence of a high score on **Lecture/Moralize** with a high score on **Communication**. **Communication** is the speaker's expressive skill in conversation with others. Someone may talk a lot and/or score high on **Lecture/Moralize** and be a poor communicator.

8. The following content may indicate the presence of **Communication** if presented in a neutral or positive manner.

   a. expresses feelings about the other interactor
   b. expresses feelings about relatives, friends
   c. expresses opinions in a clear and direct manner

d. makes positive or neutral responses to other person's negative statements or negative affect

e. summarizes mutual opinion or decision

f. comments about the communication process, i.e., makes statements about the ways both partners are interacting

g. asks other person for information

h. is assertive

i. displays appropriate humor, laughs

9. The focal may have an idiosyncratic manner of communication that appears unclear to the coder, yet is understandable to the listener in the interaction. The focal should still display reasoning, clarifications, solicitations, and respond appropriately to ongoing conversation in order to be rated high on **Communication**.

10. Interruptions do not necessarily indicate poor communication. Consider the outcome of the interruption and code down only for bad outcomes. For example:

a. for good outcomes the focal may:

(1) expand on his/her own views
(2) clarify other's position
(3) clarify his/her own position
(4) agree with the other
(5) disagree with the other

b. for bad outcomes the focal may:

(1) disrupt the conversation
(2) prevent the resolution of a problem

11. Score no higher than a '5' if the focal talks only to the camera (not to the other interactors).

12. Pay particular attention to quality when scoring **Communication**. At lower levels, the focal may merely engage in parallel commentary whereas at higher levels cooperative dialogue and discussion occur.

13. This scale is an exception to the general coding scheme because '1' means rarely or never and the midpoint is a '5' rather than between '5' and '6'.

Examples: **Communication**

1. "That is an interesting idea."
2. "This is really important to me because..."
3. "What makes you say that? I'm interested in why you think that is true."

4. "I enjoy spending time camping with the family. It is a time we can get away from other activities and just be together."
5. "I realize that you think we should save more money before we buy another car, but I think we really need to get another car now."

<u>Non-examples</u>: **Communication**

1. "What is your answer to that question?" (referring to a question on the task card)
2. "That is a stupid idea." (**Hostility**)
3. "You shouldn't spend your money on such foolish things. If you don't start watching where your money goes, you'll never have enough saved to buy something really important." (**Lecture/Moralize**)

PARENTING SCALES

INTRODUCTION TO THE PARENTING SCALES

1. It does not matter who reports the rules, expectations, and discipline/punishments, etc. (parent and/or child). The report as well as the observed behavior are used to determine the appropriate score level. If there is conflicting information in the reports from various interactors, the general rule is to score at the highest level possible based on the evidence reported by any interactor.

2. Reports of past behaviors should not be weighed as heavily as reports of current behaviors or observations of actual behaviors.

3. It is important to code the parent's behaviors (observed or reported), not the child's behaviors, when scoring the Parenting Scales. A child may behave in a particular manner due to reasons other than the parent's behavior. There is no reason to assume a perfect relationship between what parents and kids do; in addition, we can't assume that our pet theories about parenting are necessarily correct! For example, if the parent seems to be very skilled in his/her child rearing strategies (good monitoring, consistent discipline, etc.) but the child seems to be out of control, score according to the parent's behavior, not the child's.

4. We do not code effectiveness of parental behaviors.

5. Do <u>not</u> modify ratings based on the age of the child. However, do be alert to different forms of parental behaviors toward children at different ages (e.g., one parent may expect a younger child to be home at 9:30 p.m. while another parent may set the time at 11:30 p.m. for an older child)

8. *When scoring Parenting Scales for interactions involving parents and young children in activity-based tasks, reports may be limited. Score primarily on behavior observed during the task rather than on reports of parental behaviors.*

POSITIVE REINFORCEMENT (PO)

Rate: Parent (Dyadic Interaction)

This scale assesses the extent to which the parent's contingent responses to the child include the use of praise, approval, rewards, special privileges, or smiles. The parent's positive responses are contingent upon "appropriate child behavior" or upon child behavior that meets specific parental standards (stated <u>or</u> implied rules, regulations, and expectations). For positive responses by the parent to a child's behavior during the video task, also code as **Warmth/Support**.

1 =   Not at all characteristic:
Contingent parental responses to desired child behavior are <u>never </u>affirming or positively reinforcing.

2 =

3 =   Minimally characteristic:
Contingent parental responses to desired child behavior are <u>rarely </u>affirming and positively reinforcing. The parent's responses to the child's behavior may be mildly positive, e.g., infrequently offering praise and positive reinforcement.

4 =

5 =   Somewhat characteristic:
Contingent parental responses to desired child behavior are <u>occasionally </u>affirming and positive. Some evidence of positive reinforcement, e.g., praising and positively reinforcing comments.

6 =

7 =   Moderately characteristic:
Contingent parental responses to desired child behavior are <u>fairly often </u>affirming and positive.   More intensive affirmation is evident and displayed to a fairly high degree.

8 =

9 =   Mainly characteristic:
Contingent parental responses to desired child behavior are <u>frequently </u>affirming and positive. Such responses are very affirming and positive.

<u>Clarifications</u>: Positive Reinforcement

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1. Evidence of **Positive Reinforcement** may involve any of the following used in response to child behavior that the parent approves of or desires:

    a. praise
    b. approval
    c. rewards
    d. special privileges
    e. smile

2. "Appropriate behavior" refers to behaviors that comply with specific parental standards (stated <u>or</u> implied rules, regulations, and expectations). These are usually behaviors that are generally thought to be desirable, e.g., doing well in school, doing a good job on chores, getting along with others, etc.

3. To count as **Positive Reinforcement**, the behavior by the parent must be contingent on the child's behavior(s). As an aid in determining this, note whether or not the parent is responding positively to specific behaviors of the child. *With young children this will include direct responses and encouragement of child's behavior, e.g., child's compliance with task at hand.*

4. If a behavior observed during the interaction task is coded as **Positive Reinforcement**, it will also be coded as evidence of **Warmth/Support**, however, the reverse is not necessarily true. Pay particular attention to the context in determining whether or not the behavior is merely **Warmth/Support** (praise for being) or is both **Positive Reinforcement** and **Warmth/Support** (praise for doing).

5. If a parent is consistent in giving positive rewards, score this under **Positive Reinforcement**, not under **Consistent Discipline.**

6. Frequency of **Positive Reinforcement** is more important than consistency in determining the score level. For example, if the parent consistently follows through on promised rewards, but only rarely makes such promises, keep the score lower than if they always say "good job," "thank you," etc., for doing chores.

7. Promised rewards or bribes with evidence of no follow through on the part of the parent do not count as **Positive Reinforcement**; consider coding these under **Consistent Discipline**, **Inconsistent Discipline**, etc.

<u>Examples</u>: Positive Reinforcement
1. "Thanks for doing your chores." (**Positive Reinforcement** and **Warmth/Support**)

2. "I like the way you share the bike with your brother." (**Positive Reinforcement** and **Warmth/Support**)
3. "You said you would work hard to get your math grade up and you did it! Good job!" (**Positive Reinforcement** and **Warmth/Support**)
4. "Every time you get a good grade I praise you." (**Positive Reinforcement**)
5. Praising a child for doing something that meets parental standards previously stated or implied. (**Positive Reinforcement** and **Warmth/Support**)
6. *"You are so good at this!" (**Positive Reinforcement** and **Warmth/Support**)*
7. *"You're doing such a good job." (**Positive Reinforcement** and **Warmth/Support**)*
8. *"You are really good at picking up your toys." (**Positive Reinforcement** and **Warmth/Support**)*

Non-examples: Positive Reinforcement
1. "I love you." (**Warmth/Support**)
2. "I like your drawing." (**Warmth/Support**)
3. "You're a good soccer player." (**Warmth/Support**)
4. Praising a child for "being" versus for "doing." (**Warmth/Support**)
5. *"You're a big boy/girl."*
6. *"If you pick up the toys you can have your ice cream"*

INTRUSIVENESS (NT) *

       Rate: Parent (Dyadic Interaction)

This scale assesses intrusive and overcontrolling behaviors (e.g., over monitoring, interfering with child's autonomy) that are parent-centered rather than child-centered. In structured tasks, this behavior may be manifested by extreme concern about completing the task or fulfilling the parent's needs or agenda. Task completion appears more important than promoting the child's autonomy and allowing the child to explore and set the pace for the task. Intrusiveness is reflected in either a neutral, anxious, irritable, or hostile manner. Parental behavior that is characterized as warm or positive is unlikely to be coded as intrusiveness unless it is clearly unwanted by the child (see clarification #10).

1 =   *Not at all characteristic:*
      The parent displays <u>no evidence </u>of intrusive behaviors. There are no instances of parent-centered, overcontrolling behavior.

2 =

3 =   *Minimally characteristic:*
      The parent displays <u>minimal </u>intrusiveness. There are a few instances in which the parent is overcontrolling and unnecessarily imposes parent's own agenda on the child, interrupts to redirect activity, or insists on particular use of toys or props.

5 =   *Somewhat characteristic:*
      There is <u>some evidence </u>of intrusive behaviors of low to moderate intensity or frequency. At this level, intrusive behaviors occur, but still are not typical. The parent initiates some activities that are not welcome or that are ill-timed. The parent may terminate some activities in which the child is still engaged without adequate warning or transition time. Although the child is allowed some autonomy of intentions, the parent does not actively support or reinforce this perspective in the child.

6 =

7 =   *Moderately characteristic:*
      The parent <u>fairly often </u>is intrusive and overcontrolling of the child. This behavior is evident during a substantial portion of the interaction and may be more intense and/or prolonged. The task activities are performed in a manner more parent-centered than child-centered.

8 =

9 =   Mainly characteristic:
   The parent is <u>consistently and typically</u> intrusive. During the task, the parent controls the interaction, allowing the child little self-direction in activities. Parent may forcefully and physically control the child.

Note: This scale is adapted from the 24-Month Whole Family Interaction Coding, a system developed by Martha Cox (1997)

<u>*Clarifications*</u>*: **Intrusiveness***

1.   ***Intrusiveness*** *may take the form of harsh, neutral, irritable, or anxious behaviors. In any case, the parent's actions do not acknowledge or support the child's intentions as real or valid. The actions communicate to the child that it is better to depend on the parent for direction rather than to attempt individuality.*

2.   *Parents can be involved in play and interaction with the child without being highly intrusive if the parent follows the child's interest, pace, and signals.*

3.   *Indicators of **Intrusiveness** may include:*

   a.   *over-structuring the child's play*
   b.   *insisting on the parent's own agenda*
   c.   *interrupting the child to redirect activity*
   d.   *offering a continuous barrage of talk e   not allowing the child to select puzzle pieces*
   f.   *changing activities while the child still appears interested without preparing child for a transition*
   g.   *insisting that the child do something in which he/she is not interested*
   h.   *not allowing the child to make choices*
   i.   *excessively or abruptly disciplining the child*

   *These behaviors, such as interrupting or not allowing the child to respond, may also apply to the conversation regardless of the activity

4.   *Punishments imposed by highly controlling and intrusive parents are likely to not vary as a function of the severity of the misdemeanor and may reflect inappropriate expectations of what the child is able to do. Alternatively, the parent may be intrusive and overcontrolling in disciplinary situations by overdoing what would otherwise be appropriate caregiver behavior, for example, by going on endlessly explaining to a child why he/she should not do something or excessively drawing the child's attention to the consequences of his/her actions.*

5. *Synonyms for **Intrusiveness**:*

> *force upon inhibit meddle hamper interfere*
> *obstruct impede interrupt over-involved impose*
> *intrude take over*

6. *It is not possible to score a parent high ('7' or higher) on both **Intrusiveness** and **Sensitive/Child-Centered**. Intrusive behaviors are adult-centered, show a lack of sensitivity to the child's interests, needs, and abilities, and inhibit development of the child's autonomy.*

7. Behaviors that are discussed by either interactor as having occurred in the past counts towards this code.

8. The parent does not respect the child's personal space (e.g., poking).

9. References to examples of intrusive behaviors outside the task should also be counted though not as strongly as those during the interaction. Such references may be alluded to by the parent or the child. If there is disagreement on the incidence, count only as a minor example.

10. Behaviors or statements that are harsh, irritable, or neutral by the parent *and* behaviors that are delivered in a positive or warm tone but are persistent and clearly unwanted by the child, make the child uncomfortable, or persist despite resistance by the child do count as **Intrusiveness.**

11. Intrusions into the child's space such as touching the child or pointing very close to the child when coupled with a negative affect count both as **Hostility** and **Intrusiveness,**

Examples: Intrusiveness
1. *Child holds a block and attempts to place it into a slot.*
   Parent says: "Here, try this block instead and use this other slot."
2. *Parent: "I think you should put away all the legos first and then all the puzzle pieces."*
3. *Parent: "She said you had to pick up the toys, so I don't care if you don't feel like doing it right now. You have to get it done. Now do it!"*
4. *Parent gives a continual barrage of directions without giving child chance to initiate any activities on his/her own.*

5. Parent abruptly interrupts the child, point in his face, and says, "You're going to need braces soon."
6. Parent demonstrates irritability or frustration towards child.
7. Parent gently strokes the child's hair.
   Child: "Mom, please stop."
   Parent continues to stroke the child's hair: "But your hair is so beautiful"
8. Parent: "Oh I know that she really likes you."
   Child: "Mom, cut it out!"
   Parent: "No, I know she really has a crush on you!"

Non-examples: Intrusiveness
1. *Child holds a block and attempts to place it into a slot.*
   Parent says: "That block you are holding has rounded edges. Look for the slot with rounded edges."
2. *Parent: "Which toys do you want to put away first?"*
3. *Parent: "She said you had to pick up the toys. I know you'd rather play with them, but it is time to put them away now."* 4. *Parent: "OK - now where should we try the feet?"*

Sensitive/Child-Centered (CC) *

Rate: Parent (Dyadic Interaction)

This scale assesses the extent to which the parent's interactions toward the child are childcentered. The parent displays an awareness of the child's needs, moods, interests, and capabilities. He/she anticipates rather then merely complies with the child's request and needs. Interactions with the child are well timed and paced to the child's behavior and mood. The parent's interactions appear to be "in sync" with those of the child. If the child initiates interaction, the parent responds appropriately based on the child's behavior and speech. The parent paces activity to keep the child engaged and interested but allows the child to disengage if interest is lost. Attempts to engage and/or redirect the child permit the child as much choice, control, and autonomy as possible while enforcing necessary rules, regulations, and constraints.

_1 =_ **_Not at all characteristic:_**
The parent <u>never </u>displays sensitivity to the child. Parent does not respond to the child or responses are ill -timed or inappropriate.

_2 =_

_3 =_ **_Minimally characteristic:_**
The parent <u>rarely </u>displays sensitivity to the child. Although some responses show a vague awareness of the child's needs, most responses are characteristically weak and/or inappropriate.

_4 =_

_5 =_ **_Somewhat characteristic:_**
The parent <u>occasionally </u>displays awareness of the child's needs and capabilities. On balance, however, the parent only sometimes responds sensitively to the child's needs.

_6 =_

_7 =_ **_Moderately characteristic:_**
The parent <u>fairly often </u>displays behaviors that are sensitive and responsive to the child. The parent is involved, responds appropriately to the child's cues, and demonstrates awareness of the child's needs. The parent may have a few instances of insensitive behaviors, but is predominantly sensitive.

_8 =_

9 =   Mainly characteristic:
   The parent is <u>frequently and consistently </u>sensitive and responsive to the child. Interactions are characteristically well timed and appropriate and show a good mix of support and fostering independence.

*Note: This scale is adapted from the 24-Month Whole Family Interaction Coding, a system developed by Martha Cox (1997)

<u>*Clarifications*</u>: **Sensitive/Child-Centered**

1.   *A **Sensitive/Child-Centered** parent is not only aware of the child's emotional state, mental capabilities, and needs, but also uses this awareness to guide interaction with the child.*

2.   **Sensitive/Child-Centered** *parents manage discipline in appropriate ways: neither overcontrolling nor detached, neither harsh nor indulgent. A sensitive parent displays awareness of reasons for the child's behavior and fits an appropriate response to misbehavior.*

3.   *Sensitive discipline involves indications that the parent is aware of what motivates the child and offers an explanation or rationale to the child about why discipline is taking place. Note, however, that excessive explanations and rationales can reflect insensitive parenting rather than sensitive parenting (e.g., **Intrusiveness**, **Lecture/Moralize**). Especially for young children, long-winded speeches and lectures often reflect the parent's lack of awareness of the child's developmental level.*

4.   *Indicators of **Sensitive/Child-Centered** behaviors include:*

   a.   *acknowledging the child's affect*
   b.   *comments that are responsive to the content of the child's talk and/or activity*
   c.   *facilitating, but not overcontrolling, the child's play with objects*
   d.   *appropriately timing activities to reflect the child's interests*
   e.   *changing pace when the child appears understimulated, overexcited, or tired*
   f.   *picking up on the child's interest in toys or play materials*
   g.   *sharing positive affect*
   h.   *providing* an appropriate level of stimulation and appropriate range and variety of activities
   i.   *timely discipline that matches the nature of the violation under consideration to the child's ability to understand and benefit from the reprimand*
   j.   *general flexibility in handling compliance and autonomy issues, including not overreacting*
      to noncompliance and supporting autonomy while permitting dependence
   k.   *anticipating child's response*

5. *Ratings on this scale should be based on both quality and quantity of the parent's behavior.*

6. *Sensitivity can be manifested through the parent's response to the child's distress, anger, or frustration. It may involve speaking sympathetically to the child, approaching the child, redirecting the child's activities, hugging, patting, or holding in lap and comforting when the child appears distressed.*

Examples: Sensitive/Child-Centered
1. *Child cannot find correct puzzle piece and appears frustrated. Parent notices and gives child cues.*
2. *Child leaves task and parent begins to do puzzle saying, "Hey, this has Grover in it!" Child returns to do puzzle with parent.*
3. *Child attempts to put the nose on Mr. Potato Head. Parent says, "You've almost got it!"*
4. *Parent says, "Do you need a drink?" when child seems thirsty.*
5. *Parent says, "I know that made you sad."*
6. *Parent says, "I think some of your happiest times are with your Dad."*
7. *Parent says, "How did you feel when that happened?"*
8. *Parent says, "Do you want me to do anything to help you do your job better?"*
9. *Parent says, "When you're happy, I'm happy."*
10. *Parent says, "I think this might be hard for you to talk about"*
11. *Parent says, "Remember, you can only have one bag of chips. I don't want you to spoil your dinner."*
12. *Child says, "It's not fair that you grounded me!" and parent explains rationale for grounding as a consequence.*
13. Shared laughter (see clarifier 4g.)

Non-examples: Sensitive/Child-Centered
1. *Child cannot find correct puzzle piece and appears frustrated. Parent says, "We have to hurry and get this done."*
2. *Child attempts to put the nose on Mr. Potato Head, but has the piece upside down. Parent says, "That's wrong. Try something else."*
3. *Insisting the child do the activity instead of getting a drink when the child seems thirsty.*
4. Parent provides a consequence without an explanation (e.g., Parent says, "You are grounded for not cleaning your room.")
5. Parent says, "I know that made you sad." Child says, "No it didn't." Parent continues to insist that it did.

GUILTY COERCION (GC)

Rate: Parent (Dyadic Interaction)

This scale assesses the degree to which the focal achieves goals or attempts to control or change the behavior or opinions of the other by means of contingent complaints, crying, whining, manipulation, or revealing needs or wants in a whiny or whiny-blaming manner. These expressions convey the sense that the focal's life is made worse by something the other interactor does. Whininess that is part of **Guilty Coercion** involves depressed, worried affect or self-pity.

1 = Not at all characteristic:
The focal displays <u>no evidence</u> of guilty-coercive or manipulative behavior.

2 =

3 = Mainly uncharacteristic:
The focal <u>rarely</u> demonstrates guilty-coercive behaviors. Such behaviors are of low intensity or frequency and are quickly abated; they are the exception rather than the rule.

4 =

5 = Somewhat characteristic:
The focal <u>sometimes</u> displays guilty coercive behaviors of low or moderate intensity. More extreme behaviors rarely, if ever, occur. One moderately intense instance of **Guilty Coercion** may be scored '3'.

6 =

7 = Moderately characteristic:
The focal displays more extreme evidence of frequent or intense guilty-coercive behaviors. **Guilty Coercion** occurs <u>fairly often</u>. One quite intense occurrence of **Guilty   Coercion** may be scored '4'.

8 =

9 = Mainly characteristic:

The focal <u>frequently</u> displays evidence of guilty-coercive behaviors. Such behaviors are   of high intensity or frequency. **Guilty Coercion** is the typical mode of influence for the focal.

<u>Clarifications</u>: Guilty Coercion

1. **Guilty Coercion** may be considered ONE METHOD of CONTROL that is possible within an interaction. To score as **Guilty Coercion** it must be fairly clear (implicitly or explicitly) that the focal is attempting to change or manipulate the other interactor's behavior or opinions using the behaviors described below. The central feature of **Guilty Coercion** is the attempt to change another's behavior or opinions through guilt induction; i.e., the message is given that if the recipient doesn't behave as requested, he or she will be harming or mistreating the focal.

2. Although all of the behaviors listed below are examples of **Guilty Coercion**, the starred behaviors are more typically displayed by children.

*a. whining	g. scheming
*b. crying inappropriately	h. sighing
*c. lying, primarily as	i. whiny
d. nagging j. nasal tone	
e. frustrated k. "poor me"	
f. being a martyr	

3. <u>Listen</u> for a high-pitched (nasal) sing-song voice tone. When the focal speaks in a whiny or "poor-me" tone of voice in order to achieve a particular end, code this behavior as **Guilty Coercion**.

4. <u>Watch</u> for the use of whining when someone:

    a. does not get his/her way
    b. is worried
    c. does not understand something
    d. is being criticized or punished
    e. is describing something he/she doesn't like or doesn't want

5. Tone of voice and facial expression are very important in differentiating between **Guilty Coercion and Hostility.** Tone in **Guilty Coercion** is whiny, self-pitying, sorrowful, depressed. Tone in **Hostility** is blaming, hostile, agitated, caustic, cutting, and sarcastic.

6. Code the <u>delivery</u> and content of the focal's coercive statement, NOT the response of the other interactor. For example, the statement, "I need new glasses, too. We need more money. You'll have to start doing something to earn money," delivered in an angry, blaming tone would not be **Guilty Coercion**. It must be delivered in a whiny manner.

7. Statements presented in the form of "You should…" may be coded as either **Guilty Coercion** or **Angry Coercion**, and/or **Lecture/Moralize**. Affect, as well as motivation of the statement, is important in determining how to code the statement. **Guilty Coercion** is meant to change behavior in a whiny, "poor me" manner. **Angry Coercion** is meant to change behavior in a hostile, sarcastic, or threatening manner. **Lecture/Moralize** is more of a monologue about the way things should or shouldn't be and may or may not include elements of guilt induction (**Guilty Coercion**) or threat (**Angry Coercion**).

8. To be coded as **Guilty Coercion**, statements presented in the form of "You should…" must **meet all three of the following criteria**. The focal must:

   a. attempt to manipulate or change the other interactor's behavior or opinions
   b. use a whiny, "poor me" tone of voice
   c. try to make the other interactor feel sorry for the focal or feel guilty about not complying with the focal's needs

9. Count reports of **Guilty Coercion** (by parent or child) that occur outside of the task.

Examples: Guilty Coercion
1. "I suppose I'll have to pick up after everyone." (Implies the other family members should pick up after themselves.)
2. "You make me unhappy when you do that."
3. "You're ruining my life."
4. "You make me so sad."
5. "I never thought you'd do that."
6. "You cause me such trouble."
7. "You disappoint me when you do that."
8. "You embarrass me."
9. "It makes me upset when you…" (Implies the speaker would like the other person to stop doing something.)
10. "Look at all I've done for you and you don't even appreciate it." 11. "If you just stopped doing that I wouldn't be so stressed."

Note: For all these examples, there must be the suggestion of a desired change in behavior. For example, the statement "You make me so sad" must include the indication that if the recipient changed his/her activities, he/she would no longer make the focal sad.

Possible examples: Guilty Coercion

1. "You should know better..." (also **Lecture/Moralize**)
2. "Don't you think it's about time you start doing..." (also **Lecture/Moralize**)
3. "You should be ashamed of yourself for breaking your promise." (also **Lecture/Moralize**)
4. "Shame on you - you should know better." (also **Lecture/Moralize**)
5. "I'd expect more of you." (also **Lecture/Moralize**)
6. "Your poor mother worries so when you..."

Non-examples: Guilty Coercion

1. "You stupid idiot." (**Hostility** and **Verbal Attack**)
2. "Stop it or you'll be sorry." (**Hostility** and **Angry Coercion**)

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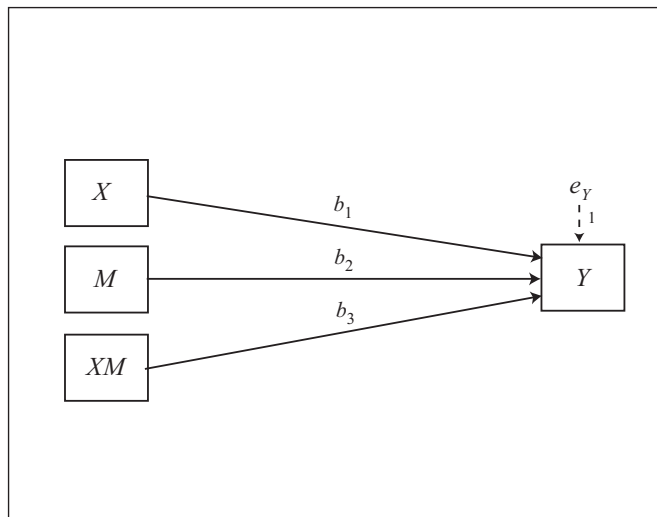
Appendix B. PROCESS Macro Conceptual and Statistical Diagram

Model 1

Conceptual Diagram
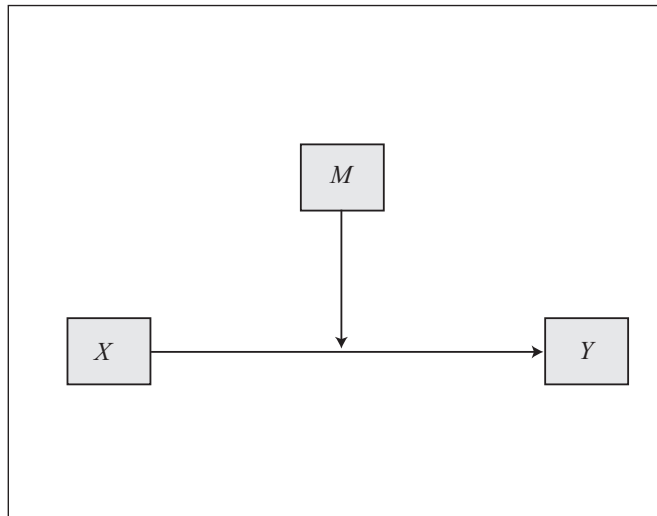
Statistical Diagram

Conditional effect of X on $Y = b_1 + b_3M$

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