

Exploring the Link Between Sensitive Temperament and Depression: The Roles of  
Parenting Environment and Empathic Personal Distress

by

Wenxi Yang

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Graduate Supervisory Committee:

Paul A. Miller, Chair  
Deborah L. Hall  
Nicole A. Roberts

ARIZONA STATE UNIVERSITY

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## ABSTRACT

This study investigated the relation between Sensory Processing Sensitivity (SPS) temperament and depression, and whether such a relation might be further influenced by the indirect effects of parenting environment and empathic personal distress. A moderated mediation model was proposed to explain the underlying relations among SPS, depression, parenting environment and empathic personal distress. That is, greater levels of SPS temperament might predict higher levels of empathic personal distress, which then leads to increasing likelihood of experiencing depression. Moreover, it was predicted that this mediation relation might be significantly stronger under a less positive parenting context. The present study recruited 661 participants from a U.S. university and implemented questionnaires in an online survey. There was a significant main effect of SPS temperament in predicting empathic personal distress and depression, such that the more sensitive individuals reported higher empathic personal distress and depression. There also was a significant main effect of parenting environment on depression, where more positive parenting was associated with less depression. Empathic personal distress was found to partially mediate the relation between SPS and depression. That is, the association between SPS and depression could be partially explained by empathic personal distress. However, parenting environment did not moderate the main effect of SPS temperament on depression, the main effect of SPS on empathic personal distress, or the mediation model.

## DEDICATION

I dedicate this thesis to God Almighty, my creator, my strength, my comforter, my source of wisdom and inspiration. Thank you for carrying me through those storms, mountains, and those hopeless nights.

To my parents, who supported my education and encouraged me to pursue my dreams in a country that is thousands of miles away from home. Thank you for your protection, love, and patience. Thank you for teaching me to be a person with compassion, kindness, and love. It is truly my honor and blessing to have you as my parents in this life.

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## CHAPTER 1

### INTRODUCTION

Temperament is a relatively stable biological trait that influences individuals' emotions, behavior and psychological outcomes (Evans & Rothbart, 2008). In the 1980s, Thomas and Chess (1987) started to study temperamental characteristics in children and infants. According to them, there are three general types of temperaments including easy (i.e., approachable, active, and adaptable), slow-to-warm (i.e., less active, shy, and slowly adjusting to new situations), and difficult (i.e., irregular eating and sleeping schedules, intense negative emotionality, and extreme difficulty in adjusting to new environments). Since then, research in temperament has been evolving and growing in many different directions. In the mid-1990s, sensory processing sensitivity (SPS) temperament was first introduced (Aron & Aron, 1997), and has been studied over the next couple decades by developmental and personality researchers.

SPS is an aspect of one's general temperament profile that is defined by deeper cognitive sensory information processing and higher emotional reactivity towards environmental stimuli (Aron et al., 2012). Researchers investigating the possible evolutionary basis of SPS have suggested that this general trait of sensitivity is associated with an organism's intensity of responding to environmental stimuli, and this fundamental sensitivity trait has been observed across 100 species (Aron et al., 2012; Sih et al., 2004; Wolf et al., 2008). According to Aron et al. (2012), the core characteristics of SPS include overstimulation responding to excessive demands, greater awareness of subtle sensory cues, a longer latency and deeper processing of contextual information, and stronger emotional reactivity across both positive and negative environmental

contexts. Thus, individuals with high SPS might seem to be more easily aroused by sensory stimulation, such as loud voices, unpleasant smell and flashing lights. However, their sensitivity also heightens their awareness of real or potential changes in the environmental context. They also are more prone to evaluating this contextual information at a deeper or more complex level, which confers survival advantages when considered in an evolutionary context (Aron & Aron, 1997; Aron et al., 2005).

Along with their original work on conceptualizing SPS temperament, Aron and Aron (1997) developed the 27-item Highly Sensitive Person Scale (HSPS) to measure SPS as a unidimensional construct. Items on their scale assess individuals' sensory information processing and emotional reactivity characteristics. In contrast to Aron and Aron's (1997) view on SPS temperament as a unidimensional construct, others have suggested that it consists of multiple dimensions (Evans & Rothbart, 2008; Smolewska, McCabe, & Woody, 2006).

Smolewska et al. (2006) proposed a three-factor framework by examining the psychometric properties of Aron and Aron's (1997) HSPS scale with 851 university students. Using principal component analysis, they found the HSPS scale consisted of three components; Ease of Excitement (EOE), Aesthetic Sensitivity (AES), and Low Sensory Threshold (LST). According to Smolewska et al. (2006), EOE represents the emotional reactivity due to excessive demands (e.g., "Do changes in your life shake you up?"). AES describes the sensitivity to aesthetic cues (e.g., "Are you deeply moved by arts and music?"), and LST refers to individuals' discomfort resulting from sensory overstimulation (e.g., "Are you easily overwhelmed by things like bright lights, strong smells,

coarse fabrics, or sirens close by?"). These three factors were also found to be weakly to moderately related (i.e., intercorrelations ranged from .23 to .32).

Evans and Rothbart (2008) also challenged the unidimensional nature of SPS by comparing the HSPS scale with the 36-item version of Adult Temperament Questionnaire (ATQ) developed by Evans and Rothbart (2008). In a sample of 297 college students, they found a result similar to Smolewska et al.'s (2006) three-factor-model. However, on a conceptual basis, they proposed a two-factor model that included temperamental negative affect (i.e., sensory discomfort and emotional distress due to overstimulation) and orienting sensitivity (i.e., awareness of low intensity environmental stimuli, such as subtle changes to textures, lights, and smells). Thus, according to both Smolewska et al. (2006) and Evans and Rothbart (2008), there is support for either a two- or three-factor structure for SPS temperament.

### **Sensory Processing Sensitivity Trait and Depression**

Within the temperament research field, researchers became interested in exploring the relations between temperamental characteristics and psychological outcomes, such as depression (Bakker, & Moulding, 2012; Compas, Connor-Smith, & Jaser, 2014). In 2014, Compas et al. reviewed literature on the direct and indirect associations between temperamental traits and depression. Researchers identified multiple temperamental characteristics that were risk factors for depression. They included, low positive emotionality (i.e., responsive to rewards, sensation seeking, and social involvement; Rothbart & Bates, 1998), high negative emotionality (i.e., tendency to experience more discomfort, fear, irritability, anger and sadness; Gray, 1991), and lack of constraint-attentional control (i.e., effortful control of emotions and behavior, self-regulation, task

persistence, and attentional focus; Buss, 1995). Given their similarity to some of these temperamental traits, SPS characteristics also have been found to be positively related to depression under certain circumstances (Aron et al., 2012).

By using 111 non-clinical participants recruited from social networks at a university, Bakker and Moulding (2012) investigated the direct and indirect (e.g., potential moderators and mediators) relations among SPS temperament, depression, and anxiety. With Aron and Aron's HSPS scale (1997) measuring SPS temperament as a single-dimension construct, the regression analyses revealed that higher general SPS temperament significantly predicted higher levels of depression, anxiety and stress. Results consistent with Bakker & Moulding's (2012) findings also were discovered in another study with a group of 213 college students (Liss, Timmel, Baxley, & Killingsworth, 2005). As before, SPS temperament was measured as a one-factor construct by using the HSPS scale. Based on the results of hierarchical regression analyses, SPS was significantly related to depression and anxiety. Moreover, SPS temperament uniquely predicted depression levels while controlling for anxiety and parental factors.

In 2008, Liss, Mailloux, and Erchull further tested the effect of SPS temperament on various clinical outcomes including depression. They used the three separate dimensions of SPS temperament, (i.e., EOE, LST, and AES) according to Smolewska et al.'s (2006) three-factor model of Aron's HSPS questionnaire. In their sample of 201 college students, the bivariate correlation results showed that EOE and LST factors were both positively and significantly related to depression. Conversely, AES had no association with depression. Multiple regression analyses also were conducted in this

study, and the results indicated that only EOE significantly predicted depression after controlling for difficulty in identifying feelings.

Based on the results from this study and the previous Bakker and Moulding (2012) and Liss et al. (2005) studies, EOE and LST components of SPS seem to play a more consistent role in influencing depression rather than AES. Even though LST was not a significant unique predictor to depression when controlling for other variables, its significant correlation with depression still suggested a potential direct or indirect effect (e.g., through a mediator or moderator) of LST on depression.

### **Influences of Parenting Environment on SPS and Depression**

Besides the direct association of SPS characteristics with depression, there is also evidence suggesting that parenting environment may influence this relation between SPS and depression. When Aron and Aron (1997) first proposed SPS temperament, they explained that because individuals high in SPS react to environmental cues with stronger emotional reactivity, they would be more prone to the influences of poor parenting environments. However, this hypothesis was only supported among male samples in their study in 1997. In 2005, Aron, Aron, and Davies conducted series of studies to retest this hypothesis among 213 college students. They confirmed their previous predictions and found that highly sensitive individuals were more inclined to experience negative affectivity including depression in the context of a less caring parental environment.

In Study 2 of these series of experiments (Aron et al., 2005), SPS temperament was measured as a unifactorial construct with the HSPTS scale and treated as a dichotomous variable, i.e., highly sensitive and less sensitive. Based upon infant temperament research (Kagan, 1994; Woodward, Lenzenweber, Kagan, Snidman, &

Arcus, 2000), Aron et al. selected 35% of the highest scoring individuals on the HSPS scale as the highly sensitive individuals. Accordingly, 48 participants were classified as highly sensitive, and the rest of the sample were less sensitive.

Participants' general negative affectivity was assessed as a combination of four scales, i.e., Beck Depression Inventory (Beck, 1978), Beck Anxiety Inventory (Beck, Epstein, Brown, & Steer, 1988), a three-item negative affectivity scale (e.g., "Are you a tense or worried person by nature?" "Are you prone to fears?" "Are you prone to depression?"; Aron & Aron, 1997), and an average score on how much participants "generally feel" about 10 negative moods (i.e., distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery, and afraid). Both mother and father versions of Parenting Bonding Instrument (PBI; e.g., "As you remember your mother/father in your first 16 years of life: frequently smiled at you," "Did not praise you."; Parker, Tupling, & Brown, 1979). The PBI was implemented to assess the general retrospective attachment and bonding relation between the participants and their parents. An average score combining the mother and father versions of the PBI was computed, and used as a general childhood parental environment variable.

A direct effect of SPS and an interaction effect between SPS and parental environment was found to significantly predict negative affectivity. Among highly sensitive individuals, lower scores on parenting environment (i.e., parental bonding and attachment) were associated with higher levels of negative affectivity. Among less sensitive individuals, the effect of parental environment on negative affectivity was significantly weaker comparing to the other group. In other words, individuals with higher SPS characteristics were more prone to negative clinical outcomes generally.

However, this relation was much stronger when highly sensitive individuals were exposed to a less caring parental environment. Even though depression was measured as a part of the composite negative affectivity score in this study rather than a distinct psychological outcome, this study still offered evidence of the potential moderating role of parental environment in the relation between SPS and depression.

In addition to the aversive influence of a generally less caring parental environment on highly sensitive individuals (Aron et al., 2005), researchers also have investigated specific parental practices that could negatively affect children's adaptation outcomes in general. Lengua, Wolchik, Sandler, and West (2000) examined the effect of parental rejection and inconsistent discipline, and the interaction between those two types of parental practices and temperament characteristics (i.e., negative emotionality, positive emotionality, and impulsivity) in predicting adjustment problems (i.e., depression and conduct problems) in children of divorce. Two hundred and thirty-one pairs of mothers and children who had experienced a divorce in the prior two years were recruited. Parental practices and temperament both independently predicted depression and conduct problems. Rejection and inconsistent discipline parental practices predicted both depression and conduct problems uniquely beyond the effect of temperament variables. Their significant interaction results suggested that parental rejection strongly predicted depression for children low in positive emotionality. Inconsistent discipline was also significantly associated with adjustment problems for children high in impulsivity temperamental characteristics.

Even though this study did not directly examine the interaction between the parenting environment and specific SPS temperament characteristics on depression, it

still suggested a potential interaction between specific aspects of the parenting environment and specific temperamental traits on depression. Nevertheless, these findings are consistent with the previous work by Aron and Aron (1997) and Aron et al. (2005).

### **SPS as a Differential Susceptibility Factor**

Additionally, research on the interaction of parenting practices and temperament falls into the framework of the differential susceptibility model. According to the differential susceptibility model (Belsky, 2005), there are individual differences in susceptibility to parenting environments with respect to children's social and emotional development. In other words, certain susceptibility factors would promote individuals to be more influenced by both positive and negative environmental stimuli when compared to others without those traits. According to temperament researchers (Aron & Aron, 1997; Aron et al., 2005; Pluess, 2015), SPS appeared to serve as a susceptibility factor. That is, individuals with high SPS characteristics would be more heavily influenced, both positively and negatively, by environmental stimuli such as the parental environment. Under a less caring and cold parenting environment, individuals with high SPS temperament would be influenced more negatively by this parental environment, resulting in a significantly stronger positive relation with depression than other individuals (Aron et al., 2015). Under a more caring and warmer parental environment, highly sensitive individuals would benefit more from it by developing better social competence among their peers (Pluess, 2015).

Slagt et al. (2018) offered further insight to support SPS as a differential susceptibility factor. Slagt et al. (2018) conducted a seven-month longitudinal study



assessing 264 Dutch kindergarteners through three waves. They proposed that SPS would interact with both increases and decreases in positive parenting practices in predicting externalizing behavioral problems (i.e., conduct problems and attention problems). They found that highly sensitive children were more impacted by changes in parenting environment in both directions. When parenting became more negative, there was a significant increase in highly sensitive children's externalizing problems. In contrast, when parenting environment improved, there was a significant decrease in externalizing problems among highly sensitive children. Although depression was not included in Slagt et al.'s (2018) study as an outcome variable, their results were consistent with the expectation that SPS temperament could play a role as a susceptibility factor in impacting individuals' adaptation outcomes under different parenting environments.

### **Empathic Personal Distress**

The research in the previous section suggested that the relation of SPS temperament to depression may vary depending on the levels of positive parenting. However, it doesn't explain how either temperament or its interaction with parenting might lead to depression. A small body of studies have provided some potential explanations for these underlying mechanisms, and empathic personal distress appeared to be a potential variable that may at least partially explain these relations. Empathic personal distress is an affective component or a related construct of empathy, and is usually referred as an aversive reaction to others' negative experience accompanied by personal feelings of discomfort, physiological hyperarousal (e.g., higher heart rate, and skin conductance) and behavioral withdrawal (Eisenberg, 1988). For example, an individual who displays more empathic personal distress might avoid or minimize

communication and contact with an upset other or an emergency situation in order to regulate their own physiological and psychological state.

Besides empathic personal distress, perspective taking, fantasy, and empathic concern have also been identified as different factors of empathy (Davis, 1983). According to Davis (1983), perspective taking is the ability to appraise things from others' point of view, and fantasy is the tendency to identify with the roles and situations of others, including fictional characters, (e.g., characters from movies) and imagining oneself in the situation of the other. Empathic concern represents the experience of warm, concerned, and compassionate feelings towards others in distress. Different terminologies have been used to describe and define the same or similar construct of empathy, however, it is generally agreed that empathy consists of two main components, i.e., cognitive and affective empathy. Davis (1983) found that perspective taking, and fantasy appeared to be the two cognitive components of empathy. Empathic concern, and empathic personal distress served as the two contributors to the affective component of empathy.

### **Empathic Personal Distress and Depression**

Research has also been conducted to examine the distinctiveness of cognitive and affective components of empathy (Cox et al., 2012; Strayer, 1980), and it has been suggested that cognitive and affective empathy function independently from each other in terms of associations with different psychological outcomes. For instance, Green, Missotten, Tone, and Luyckx (2018) conducted a longitudinal study to explore the effects of cognitive and affective empathy on depressive symptoms and self-esteem among 724 Belgian adolescents. Both affective (i.e., the ability to have an appropriate emotional response towards others' affective state) and cognitive (i.e., the ability to understand and

rationalize others' emotions) empathy were assessed with the Dutch version of the Basic Empathy Scale (BES; Jolliffe & Farrington, 2006). Examples for the cognitive and affective subscales, respectively, are "It is hard for me to understand when my friends are sad," and "I usually feel calm when other people are scared." Their results revealed that cognitive and affective empathy were distinct constructs that influenced individuals' adaptation outcomes differently or even in an opposite direction. Cognitive empathy was found to significantly predict more positive outcomes (i.e., higher levels of self-esteem, and lower level of depression), and affective empathy significantly predicted an enhanced likelihood of experiencing depression and less self-esteem.

Although empathic personal distress was not explicitly evaluated in the study, the researchers suggested that the empathic personal distress component was included in their affective empathy measure (BES; Green et al., 2018). Therefore, this study not only provided evidences on the distinctiveness of cognitive and affective empathy in affecting psychological outcomes, but also specified a link between affective empathy and depression. This association between affective empathy with a variety of internalizing problems, including depression, anxiety and guilt have been explored in other research as well. In a review of the literature between empathic personal distress and internalizing outcomes, Tone and Tully (2014) reported findings consistent with Green et al., (2018). Tone and Tully proposed that empathy is a "risky strength" because of its association with internalizing disorders such as depression and anxiety. More specifically, they stated that empathic personal distress might serve as a pathway linking affective empathy to maladaptive internalizing outcomes such as depression.

In addition, Thoma et al. (2011) examined the relations between subcomponents of empathy (i.e., perspective taking, fantasy, empathic concern, and empathic personal distress) and depression among 20 unipolar depressive and 20 non-clinical participants. Davis's (1983) IRI scale was used to measure the four different subcomponents of empathy. They found that clinical depressive group showed an overall higher empathy score (i.e., average of all 4 subcomponents) than the non-clinical group. This significant difference in the overall empathy measure between these two groups were driven by clinical group's much higher empathic personal distress score. Furthermore, a significant positive correlation was found between the severity of depressive symptoms and levels of experiencing empathic personal distress.

Similarly, another correlational study also specifically examined the association between empathic personal distress and depression using Davis' (1983) IRI scale among 145 college students (Kim & Han, 2017). They found that empathic personal distress was positively related to depression, self-criticism and negative self-concept. In contrast, empathic concern had no association with depression, and negatively predicted self-criticism and negative self-concept. Even though a correlation could not indicate the causal direction of the relation, both Kim and Han's (2017) and Thoma et al.'s studies (2011) suggest that depression was associated with empathic personal distress. More importantly, Kim and Han's results (2017) also indicated that although empathic personal distress and empathic concern were both subcomponents of affective empathy, empathic personal distress appeared to be the one strongly associated with depression.

Based upon the results of their review, Tone and Tully (2014) further proposed that the extent to which depression could be driven or at least partially explained by

empathic personal distress could vary depending on a range of certain interindividual and intraindividual factors. The intraindividual factors that they suggested broadly included genetically or neurobiologically influenced predispositions to physiological hyperarousal and cognitive factors such as negative thinking. Given that temperamental characteristics are based, at least in part, by genetically-based biological predispositions (Aron et al., 2012), I decided to propose SPS as a related but not identical intraindividual factor that might be associated with the relation between empathic personal distress and depression.

### **Empathic Personal Distress Explains the Link Between SPS and Depression**

As described previously, when developing the construct of SPS temperament, Aron and Aron (1997) found that highly sensitive individuals were strongly affected by others' mood and emotions in addition to their stronger emotional reactivity to characteristics of the environment. Given that high SPS individuals tend to be more aware of and attuned to others' emotions (i.e., positive and negative emotion), a small amount of research began to explore the association between SPS and general empathy. Cooper et al. (2014) studied career development for high SPS individuals. She recruited 35 self-identified high SPS adult participants from social media groups dedicated to SPS on Facebook and interviewed each participant for about 60 – 90 minutes through Skype or phone. Aron's HSPS scale was used to measure the level of SPS traits among the participants. By utilizing the frequency of mentions and tacit, empathy appeared to be the factor most frequently mentioned and strongly valued by the participants.

In addition, an fMRI study later shed more light on the link between SPS and general empathy by evaluating the activation level of the brain regions associated with empathy (Acevedo et al., 2014). This study explored the neural correlates of SPS

temperament in 18 adult participants' when responding to others' emotions. Participants were presented with photographs of strangers and partners with either positive, negative or neutral facial expressions. Acevedo et al. (2014) discovered that individuals with more SPS temperament displayed more activation in brain areas associated with awareness, integration of sensory information, empathy, and action planning in both stranger and partner emotion conditions. These results provided evidence of fundamental social affective awareness and responsiveness in SPS, and a possible link between SPS and general empathy consistent with the previous studies (Aron et al., 1997; Cooper et al., 2014).

Although these studies did not directly test the relation between SPS temperament and empathic personal distress, SPS's association with general empathy and its stronger reactivity (e.g., neural activation) towards others' emotions could possibly dispose them to be more vulnerable to experience empathic personal distress. For example, in the face of others' distressing emotions, highly sensitive individuals have a higher likelihood to be overwhelmed or "over aroused" by it due to their stronger emotional reactivity to environmental stimuli including emotional stimuli from their surrounding others and greater awareness of social affective cues such as a subtle distress of others. When a highly sensitive individual was overstimulated either by the contextual sensory or affective information like others' distress emotions, one of the commonly observed behavioral patterns was a longer latency to process, which was associated with withdrawing from the situation. That withdrawing behavior from those situations would allow them to effectively plan later actions, regulate their emotional arousal, and, notably, it resembles the behavioral characteristics of empathic personal distress as well.

Some research has started exploring the mediating role of general or certain aspects of empathy on the association between temperamental traits and psychological outcomes such as depression. Lee (2009) recruited 204 college students to investigate the role of empathy including empathic personal distress on the relation between neuroticism characteristics and depression. Davis's IRI scale was used to measure the four different subcomponents of empathy (i.e., fantasy, perspective taking, empathic personal distress, and empathic concern). It was found that the fantasy subscale was positive related to both neuroticism and depression, and it partially mediated the relation between neuroticism and depression. Although empathic personal distress was not a unique mediator by itself in this relation, it did interact with neuroticism temperament to influence levels of depression. These findings suggested that the likelihood of experiencing depressive symptoms was not only influenced by neuroticism traits, but also could be explained at least partially by some components of empathy.

As introduced earlier, there has been a well-established link between SPS temperament and depression (Aron et al., 2005; Bakker, & Moulding, 2012; Liss et al., 2008). Individual with higher SPS characteristics tend to have a higher likelihood of experiencing depressive symptoms. Taken together with the additional research evidence on the positive association between empathic personal distress and depression, and between SPS temperament and empathic personal distress (Tone & Tully, 2014; Green et al., 2018), I propose that empathic personal distress would mediate the relation between SPS temperament and depression.

## **Impact of Parenting on Empathic Personal Distress**

As introduced before, adverse and maladaptive parenting (e.g., unresponsive, uncaring, and inconsistent discipline) practices have a broad range of long-term and short-term negative effects (e.g., conduct problems, and depression) on people's childhood experience and their later life adaptation outcomes (Slagt et al., 2018; Woodward et al., 2000). Researchers have also suggested that the parenting environment plays an important role in affecting individual development of empathy and empathy-related outcomes, where positive parenting practices (e.g., secure attachment, support, and emotional support) appeared to contribute to healthy empathy development including better cognitive perspective taking skills (Taylor, Eisenberg, Spinrad, Eggum, & Sulik, 2013) and less positive parenting practices led to more empathic personal distress associated with more risks for negative clinical outcomes (Miklikowsa, Duriez, & Soenens, 2011; Tone & Tully, 2014).

Similarly, in 2012, Antonopoulou, Alexopoulos, and Maridaki-Kassotaki recruited 190 primary school children to investigate the role of father's parenting style on their development in self-esteem and empathy. Parenting was measured by the Greek version of Parenting Styles and Dimensions Questionnaire in four subscales, i.e., authoritative, authoritarian, permissive, and strict (PSDQ; Maridaki-Kassotaki, 2009; Robinson, Mandleco, Olsen, & Hart, 2001). Empathy was computed as a composite score including both cognitive and emotional components, and it was assessed by the adapted Index of Empathy for Children and Adolescents (Bryant, 1981). The regression analyses showed that paternal parenting style significantly influenced children's self-esteem and empathy levels. Specifically, more supportive paternal parenting practices predicted



higher levels of empathy and self-esteem, and less supportive paternal parenting projected lower levels of empathy and self-esteem.

In another study, Miklikowska et al. (2011) explored the effects of both maternal and paternal parenting environment on the changes of adolescents' affective (i.e., empathetic concern) and cognitive empathy (i.e., perspective taking) among 678 middle adolescents in a 3-wave longitudinal study. Empathic concern and perspective taking were assessed by the Dutch version of Davis' IRI scale. Aligned with Antonopoulou et al.'s (2012) results, more supportive and emotional responsive paternal practices were also associated with higher levels of perspective taking characteristics in this study. They also found that more positive maternal practices predicted an increase in empathetic concern, but only in daughters. Consistent with Tone and Tully's (2014) perspective, these two studies (Antonopoulou et al., 2012; Miklikowska et al., 2011) offered additional evidence on the positive associations between supportive parenting and the development of positive empathy-related outcomes. Empathetic personal distress was not individually assessed or analyzed in these studies, so the direct link between parenting environment and empathic personal distress was not evaluated either.

However, it was clear that negative parenting elicits negative emotional arousal in children, and then that leads children to be more self-focused in attempting to regulate their negative affective states (Lengua et al., 2000; Liss et al., 2005). Moreover, according to social learning theory (Bandura, 1977), negative parenting practices model negative arousal when interacting with others, and then becomes a negative stimulus to the children (i.e., portending potential punishment). Therefore, when faced with negative arousal of others (e.g., others' distress emotions), children would be more likely to

experience empathic personal distress due to the lack of parenting modeling and education of positive emotional regulation strategies. Consequently, it is logically to propose that less positive parenting environment would lead to more aversive empathy-related characteristics, such as empathic personal distress.

### **Impacts of Parenting and SPS on Empathic Personal Distress**

In that regard, researchers also have studied the combined impact of parenting and temperamental factors in the development of empathy in recent years. Chaparro and Grusec (2016) assessed the link among neuroticism temperamental characteristics, parental practices (i.e., inconsistent discipline, and authoritarian parenting) and general empathy in a longitudinal study of adolescents. They found that mother's inconsistent discipline predicted decreases in overall empathy for adolescents with lower neuroticism traits.

In addition, Wagers and Kiel (2019) also investigated the effects of specific parental styles (i.e., authoritative, warmth and reasoning) on empathy among 117 toddlers (i.e., 24 months) with high versus low inhibited temperament (i.e., quiet, reticent, and avoids novel situations and people) in a longitudinal study. Mothers reported on their children's empathy levels by using the empathy subscale of the Infant–Toddler Social and Emotional Assessment scale (e.g., “Worries if someone is hurt”, “Notices others’ feelings”; ITSEA; Carter, Briggs-Gowan, Jones, & Little, 2003). Multiple moderating effects were found in this study. For children with higher levels of inhibited temperament, maternal reasoning predicted lower levels of overall empathy. For children with lower levels of inhibited temperament, maternal warmth predicted higher empathy.

Neither of these two studies tested empathic personal distress separately as a unique construct, but these findings shed light on the possible interacting effect of parenting environment, temperament, and empathy characteristics. Temperamental factors might interact with parenting environment to facilitate the progression of empathic personal distress. As described earlier, less positive parenting would lead children to be more prone to experience empathic personal distress in the face of others' negative emotions. Taken together this relation and the possible interactive effects between parenting and SPS temperamental characteristics, SPS might also serve as a susceptibility factor influencing the extent to which a person could be affected by positive or negative parenting in terms of developing empathic personal distress.

As a susceptibility factor, SPS temperament was suggested to dispose individuals to be more affected by both negative and positive parenting environment than others without this characteristic (Slagt et al., 2018). Given the fact that negative parenting in general tends to provoke a less positive empathy-related outcomes, i.e., empathic personal distress, this effect would be even stronger among high SPS individuals, who display greater affective arousal toward environmental stimuli. Hence, under a poor parenting environment (e.g., lack of warmth, rejection, and criticism), high SPS individuals would display a heightened negative affective reaction responding to distressful events, such as interactions with others in distress (i.e., empathic personal distress). Conversely, under a more positive parenting environment, high SPS individuals would have a significantly weaker or no association with empathic personal distress.

Considering the relations discussed above, in the proposed model of this thesis, parenting environment would moderate the relation between SPS temperament and

depression and the relation between SPS temperament and empathic personal distress. Empathic personal distress then would help explain the path from SPS temperament to depression as a mediator. And last, I propose a moderated mediation relation to explain the underlying mechanisms among these four variables described above. Specifically, in a less positive parenting environment, individuals with more SPS temperamental traits would exhibit more empathic personal distress, which then would predict higher levels of depressive symptoms. Conversely, in a moderate or highly positive parenting environment, the relation between sensitive temperament and empathic personal distress, and the relation between sensitive temperament and depression would both be significantly weaker or nonsignificant. Thus, the overall mediation model would be significantly weaker or non-significant under a moderate or highly positive parenting environment.

### **Current Study**

In past research, SPS temperament has been positively associated with depression (Liss et al., 2008) and empathic personal distress (Green et al., 2018). Separately, negative parenting practices have predicted depressive symptoms (Slagt et al., 2018) and empathic personal distress (Wagers & Kiel, 2019). As far as we are aware, however, no research has taken the above-mentioned constructs into account together to explore potential mechanisms underlying the relation between SPS temperament and depression. The goal of the current study is to bridge the gap in the literature, and investigate the relations among SPS temperament, parenting environment, empathic personal distress and depression using a cross-sectional questionnaire design. In the proposed moderated mediation model (Figure 3), the following hypotheses were proposed.

**Hypothesis 1.** Parenting environment is expected to moderate the relation between SPS temperament and depression.

**Hypothesis 2.** The relation between SPS temperament and empathic personal distress is expected to vary depending on the level of parenting.

**Hypothesis 3.** Finally, I predict that empathic personal distress will serve as a mediator between SPS and depression, especially in a less positive parenting environment. That is, the mediating role of empathic personal distress on the relation of SPS to depressive symptoms will be further moderated by parenting environment.

## CHAPTER 2

### METHOD

#### **Participants and Procedure**

Prior to the collection of data, this study was reviewed and considered exempt by Arizona State University (ASU)'s Institutional Review Board in April 2018. Data were collected from April 2018 to August 2018 through the university research participation system (SONA) in the form of an online survey. Participants were ASU students who had to be 18 or older to take this online survey. We stated in advance that the purpose of this study was to learn about the relation between an individual's personality and how they react to various life events. Participants who were interested in receiving course credit for their participation were asked to provide their course information to the researcher independently outside the online survey.

Participants ( $N = 661$ ) included both males (22.6%) and females (77.4%) from 18 to 61 ( $M = 26.94$ ,  $SD = 6.97$ ) years of age. In terms of their racial identification, 58.4% identified themselves as European-American, 25.7% as Hispanic-American, 8.3% as African-American, 7.0% as Asian-American, 3.9% as Native-American, and 7.9% as other including Asian, European, Middle Eastern, etc. Due to the fact that participants might self-identify as multi-racial (9.7%), the categories for identifying race and ethnicity were non-exclusive such that participants could select multiple categories. One hundred and forty-four participants were dropped from the analysis due to incomplete data, following a rule of excluding participants who had less than 10 minutes completion time, less than two completed questionnaires, or response bias patterns (e.g., selecting "4" as the answer on the entire questionnaire). In the remaining 661 participants, 78.9% reported

having both a mother and a father figure, and 16.9% reported having a single or no father/mother figure in their first 18 years of life.

## Measures

All measures included in the study were self-report surveys, and they are listed in Appendix B.

**SPS Temperament.** Aron and Aron's (1997) HSPS scale was used to measure SPS temperament. It contains 27 items and is scored on a 7-point Likert scale ranging from "*Extremely untrue*" (1) to "*Extremely true*" (7). According to Smolewska et al.'s (2006) three factor model of SPS, 12 items were used to measure EOE (e.g., "Do changes in your life shake you up?"), 7 items were used to measure AES (e.g., "Do you seem to be aware of subtleties in your environment?"), and 6 items were used to measure LST (e.g., "Are you made uncomfortable by loud noises?") in the current study. Two items from the original HSPS scale (i.e., "Are you easily overwhelmed by strong sensory input?" and "Does your nervous system sometimes feel so frazzled that you have to get off by yourself?") were eliminated in Smolewska et al.'s three factor structure due to cross-loadings displayed in the exploratory principal component analysis. Consequently, they also were eliminated in this study.

In this study, two items measuring the LST factor (i.e., "Are you particularly sensitive to the effect of caffeine?", and "Do you make a point to avoid violent movies and TV shows?") were further excluded due to the increase in Cronbach's reliability test by excluding them (from  $\alpha = .74$  to  $.80$ ). No items were dropped from the EOE scale ( $\alpha = .80$ ). Composite scores were then created by averaging participants' scores on each of the individual items for the LST and EOE subscales. Similar to the findings in Liss et al.

(2008), we also found that the AES subscale had lower reliability ( $\alpha = .63$ ). Liss et al. (2008) also indicated that only EOE and LST components of SPS were related to depression, and depression is the core outcome variable being examined in this study. Therefore, AES was not included in the analyses due to both statistical and conceptual reasons.

**Empathic Personal Distress.** Empathic personal distress was assessed with the Personal Distress subscale of the Interpersonal Reactivity Index (IRI; Davis, 1983). The empathic personal distress subscale consisted of 6 items assessing the “self-oriented” feelings of anxiety and unease in tense interpersonal settings. The items were scored on a 5-point Likert scale ranging from “*Does not describe me well*” (1) to “*Describes me very well*” (5). A sample item is, “When I see someone who badly needs help in an emergency, I go to pieces.” There was high internal consistency for this measure ( $\alpha = .78$ ).

**Depression.** Two measures were included to assess cognitive depression and affective depression, respectively.

**Cognitive depression.** The Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski, Kraaij, & Spinhoven, 2001) was used to measure cognitive depression, which identified individuals’ cognitive coping strategies of negative situations. The Self-blame (i.e., blaming oneself as the reason for the negative event), Rumination (i.e., repetitive thinking of the thoughts and feelings about the negative event), and Catastrophizing (i.e., explicitly emphasizing the terror of the experience) subscales were identified as the cognitive coping strategies most associated with depression (Garnefski et al., 2001), and



the 12 items of these three subscales were included in this study. Items scored from 1 (*almost never*) to 5 (*almost always*).

**Affective depression.** To assess affective components of depression, the Center for Epidemiological Depression Scale (CESD; Radloff, 1997) was included. The 20-item CESD scale measures an individual's perceived depressive symptoms by assessing the intensity of their feelings and the characteristics of depression. Instead of using the original Likert-scale response options (i.e., *less than one day, 1-2 days, 3-4 days, 5-7 days*) to assess respondents' feelings in the past week, the scoring was adapted so that a score of 1 indicated "*Almost Never*", 2, "*Sometimes*", 3, "*Often*", and a score of 4 indicated "*Almost Always*."

A composite depression score was obtained by averaging the standardized cognitive and standardized affective depression scale scores. The internal consistency across all items on this combined measure was sufficient ( $\alpha = .92$ ).

**Parenting Environment.** Forty-one items were adapted from different questionnaires to assess the overall parenting environment relevant to rearing sensitive temperament children, and the same 41 items were used to assess both father's and mother's parenting environment. According to past research on SPS temperament and parenting (Aron & Aron, 1997; Aron et al., 2005; Lengua et al., 2000; Slagt et al., 2018), we identified warmth/affection, patience/understanding, emotional support, responsiveness, and rejection/criticism as the relevant parenting practices to include in this study.

Items were drawn and modified from the Parental Bonding Instrument (e.g., "My father/mother did not seem to understand what I needed or wanted"; Parker, Tupling, & Brown, 1979), the Alabama Parenting Questionnaire (e.g., "My father/mother would pay

attention to my feelings when making plans to do things”; Frick, Christian, & Wootton, 1999), the Ghent Parental Behavior Scale (e.g., “My mother/father would take the time to figure out what I was upset about”; Leeuwen & Vermulst, 2004), the EMBU-C (e.g., “My mother/father would show me that she enjoyed my company”; Arrindell, Emmelkamp, Brilman & Monsma, 1983), and the Network of Relationship Social Provision Version (e.g., “My mother/father encouraged me to try to figure something out first before helping me”; Furman & Buhrmester, 1985).

Items were scored on a Likert scale from 1 (*Almost Never*) to 5 (*Almost Always*). One item was excluded due to low factor loadings after an exploratory factor analysis in this current sample. After reverse coding, the items with higher scores indicate more positive parental environment such as patience, care and understanding. The correlation between the composite mean score of mother and father parenting was .34 ( $p < .001$ ). The scores of mother ( $\alpha = .97$ ) and father parental environment ( $\alpha = .97$ ) items were standardized, and then averaged to obtain an overall parenting environment score. The Cronbach’s alpha of the combining overall parental environment reached .98.

## CHAPTER 3

### RESULTS

To investigate whether the relation between SPS temperament and depression vary as a function of parenting environment, separate regression analyses were performed with each of the temperament subscales (EOE and LST), parenting environment, and their interaction entered as predictors of depression. All predictors (i.e., EOE, LST, and parenting environment) were mean centered. Due to the listwise deletion of respondents with missing data for some of the variables, a total of 633 participants were included in the analyses. PROCESS macro for SPSS was used to test these hypotheses.

**Hypothesis 1.** In the first regression model, only significant main effects for EOE and parenting environment emerged as shown in Table 4. Higher scores on the EOE subscale ( $b = 0.43$ ,  $SE = 0.04$ ,  $t(629) = 12.31$ ,  $p < .001$ ), and lower levels of parenting environment ( $b = -0.14$ ,  $SE = 0.04$ ,  $t(629) = -3.95$ ,  $p < .001$ ), both uniquely predicted greater depression. Similarly, in the second regression model, only significant main effects for LST and parenting environment emerged. Higher scores on the LST subscale ( $b = 0.17$ ,  $SE = 0.02$ ,  $t(629) = 7.42$ ,  $p < .001$ ) and less positive parenting environment ( $b = -0.15$ ,  $SE = 0.04$ ,  $t(629) = -3.96$ ,  $p < .001$ ) both uniquely predicted greater depression. Contrary to Hypothesis 1, there were no significant interactions between SPS temperament (i.e., both EOE and LST subscale) and parenting environment on the likelihood of experiencing depressive symptoms.

**Hypothesis 2.** Another two moderation analyses were performed to investigate whether the relation between SPS temperament (i.e., EOE and LST separately) and empathic personal distress was moderated by parenting environment (Table 5). There

were no significant interactions between SPS temperament (i.e., both EOE and LST) and parenting environment on influencing the levels of empathic personal distress. Thus, the second hypothesis was not supported. As before, higher levels of the EOE subscale ( $b = 0.42$ ,  $SE = 0.03$ ,  $t(629) = 13.33$ ,  $p < .001$ ) was found significantly to predict a greater likelihood of experiencing empathic personal distress. A higher level of the LST subscale ( $b = 0.12$ ,  $SE = 0.02$ ,  $t(629) = 5.61$ ,  $p < .001$ ) also significantly predicted greater empathic personal distress.

**Hypothesis 3.** Finally, separate moderated mediation models were tested to examine whether (a) empathic personal distress mediated the relation between SPS (i.e., EOE and LST separately) and depression, and (b) whether this indirect effect would differ significantly at different levels of parenting environment (Figure 3). In contrast to Hypothesis 3, there was no evidence of moderated mediation among SPS, empathic personal distress, parenting environment, and depression. However, there was evidence of mediation pathways through which SPS temperament predicted depression via empathic personal distress. Simple mediation models were then performed to extract the statistical information of these significant mediation relations. In the following analyses, there were 659 participants.

As shown in Figure 1, empathic personal distress mediated the relation between the EOE subscale and depression, with the significance of the indirect effect confirmed by a 95% confidence interval that did not include zero ( $ab = 0.12$ ,  $SE = 0.02$ , 95% CI = 0.08, 0.16). The total effect of the EOE subscale on depression before taking the mediator into account was significant ( $c = 0.45$ ,  $SE = 0.03$ ,  $t(657) = 13.12$ ,  $p < .001$ ). EOE subscale also significantly predicted the mediator, empathic personal distress, ( $a = 0.42$ ,  $SE = 0.03$ ,

$t(657) = 13.84, p < .001$ ). When controlling for EOE, empathic personal distress had a significant effect on depression, ( $b = 0.28, SE = 0.04, t(656) = 6.55, p < .001$ ). After taking the mediation pathway into account, the direct effect of EOE on depression was still significant, but significantly weaker than before ( $c' = 0.33, SE = 0.04, t(656) = 8.79, p < .001$ ). That is, empathic personal distress partially mediated the relation between EOE and depression.

As shown in figure 2, empathic personal distress also mediated the relation between the LST subscale and depression ( $ab = 0.05, SE = 0.01, 95\% CI = 0.03, 0.07$ ). The effect of the LST subscale on depression before taking the mediator into account was significant ( $c = 0.14, SE = 0.02, t(657) = 6.59, p < .001$ ). LST subscale also significantly predicted the mediator, empathic personal distress, ( $a = 0.13, SE = 0.02, t(657) = 6.27, p < .001$ ). When controlling for LST, empathic personal distress had a significant effect on depression, ( $b = 0.40, SE = 0.04, t(656) = 10.00, p < .001$ ). After taking the mediation pathway into account, the direct effect of LST on depression was still significant, but significantly weaker than before ( $c' = 0.14, SE = 0.02, t(656) = 6.59, p < .001$ ). Thus, empathic personal distress also partially explained the relation between LST subscale of SPS and depression.

## CHAPTER 4

### DISCUSSION

It was hypothesized that higher levels of SPS temperament would be associated with higher levels of empathic personal distress and more risk of experiencing depressive symptoms, especially under the influence of a less positive parenting environment. Further, empathic personal distress was hypothesized to mediate the relation between SPS temperament and depression in a less positive childhood parenting context. The results of the study suggested that higher SPS subscales of EOE and LST predicted more likelihood of developing empathic personal distress and depression. Contrary to my prediction, those relations did not vary depending on the levels of parenting environment. In other words, the parenting environment was not found to moderate the existing relation between SPS temperament and depression, or the relation between SPS temperament and empathic personal distress. However, a less positive parenting environment was uniquely and significantly associated with increasing level of depression. Finally, partially supporting Hypothesis 3, empathic personal distress mediated the relation between SPS and depression, but without the effects of parenting as a moderator.

Consistent with much of the literature on SPS temperament and empathy research described in the introduction (Aron et al., 2012; Bakker & Moulding, 2012; Liss et al., 2005), individuals with more SPS characteristics were found to be more prone to depression and empathic personal distress. Because of their stronger emotional arousal and longer processing time, high SPS individuals were more likely to experience a negative psychological state in the face of stressful events. As Tone and Tully suggested (2014), certain intraindividual factors in stressful events would influence the

development of empathy and other psychological outcomes. The findings of the current study support the original hypothesis that SPS serves as one of the intraindividual factors to impact individuals' experience of depression and empathic personal distress.

As expected, less positive childhood parenting environments also were significantly associated with depression. Past research in parent-child relations, family dynamics, and attachment theories also revealed similar results about this relation (Lengua et al., 2000; Slagt et al., 2018). Unexpectedly, the overall parenting environment did not serve as a significant moderator of the relation between SPS and depression, or the path between SPS and empathic personal distress. These unexpected findings may be the result of a number of factors.

First, the parenting measure used in this study was a broad construct indicating an overall parenting environment instead of certain specific parenting practices or styles. In the past research where a significant interaction of SPS temperament or other temperamental factors and parenting emerged, the researchers tended to assess more specific and narrow aspects of the parenting environment, such as caring, retrospective bonding relation, retrospective attachment, parental rejection and inconsistent discipline (Aron & Aron, 1997; Aron et al., 2005; Lengua et al., 2000). By treating the parenting variable as one composite score including different aspects of parenting (i.e., warmth, patience, emotional support, responsivity, and rejection) in this current study, some more specific links with certain unique aspects of parenting and sensitive temperament might be underexplored. Future research is recommended to examine these relations by assessing the different components of parenting environment individually.

Second, recall bias (i.e., the lack of accuracy on questions about past parenting events or experiences) might have occurred when answering the items on the retrospective parenting environment measures. Thus, that might possibly skew the results of our study. Finally, the lack of findings did not appear due to demographic factors. As shown in Table 3, age and gender had very weak but significant relations with the independent variables included in the analyses. So, they were less likely to influence the variance among any of the predicted relations.

The proposed hypothesis that empathic personal distress mediated the relation between the level of SPS temperament and depression was supported. As indicated in Figures 1 and 2, greater sensitive temperament (i.e., EOE and LST) predicted stronger empathic personal distress, which in turn predicted higher risks of depression. With empathic personal distress as a partial mediator, it indicated that the relation of SPS to depression was not due to temperament alone. With their greater sensitivity to others' distressing emotions and more vulnerability of being affected by others' mood, highly sensitive individuals could have a higher likelihood of experiencing a more self-focused state of distress evoked by others' distress (Aron & Aron, 1997; Aron et al., 2012). Further, because of their greater intensity of emotional reactivity in response to others' aversive emotional state, they are more likely to experience empathic personal distress. And this aversive emotional response towards another's distress partially explained their tendency of developing depressive symptoms.

One could argue that empathic personal distress might share similar physiological or biological components with SPS temperamental trait, so that they are not distinct constructs. While some research has already examined the neurobiological components



of SPS temperament (Acevedo et al., 2014; Jagiellowicz et al., 2016), no research that I am aware of has investigated in the biological or physiological nature of empathic personal distress. Future studies exploring these biological features of empathic personal distress might be helpful in further distinguishing these two concepts.

Even though the behavioral and emotional response patterns might seem to overlap between SPS characteristics and empathic personal distress, I would argue, however, that SPS and empathic personal distress are two separate constructs conceptually. SPS temperament is suggested to be a relatively stable biological trait that allows individuals to be more sensitive and emotional reactive in response to sensory and affective information (Aron & Aron, 1997; Aron et al., 2012). In contrast, empathic personal distress has been defined as a self-focused state of feeling towards others' emotions accompanied by physiological hyperarousal and behavioral withdrawal (Eisenberg, 1988; Green et al., 2018). Therefore, empathic personal distress is defined and measured as a behavioral pattern or emotional response to specific social situations rather than a stable trait. Moreover, SPS has a strong neurological basis, whereas, the development process of empathic personal distress is affected by many environmental factors such as parenting, family dynamics and exposure to others' negative affect (Tone & Tully, 2014).

### **Limitations and Future Directions**

There were a few limitations of the present study. First, the sample was a college adult population, which may limit the generalizability of the results to a more diverse population. Second, all the measures were assessed by self-report and retrospective surveys. Future data collection using additional independent reports, such as clinical

diagnosis and parents' or friends' report could potentially minimize error variance due to the response and recall biases caused by the retrospective self-report method. Further, these data were cross-sectional, so that causal relations cannot be inferred. Finally, data was collected online, and that might potentially limit the diversity of the sample by only attracting participants who have access to the internet and experience with online surveys.

While this study offered some evidence on these hypothesized relations, it also suggested a number of directions and considerations for future research. As mentioned before, it will be beneficial to assess each component of parenting environment separately in order to extract more information about the underlying links among parenting, SPS temperament and certain adaptation outcomes. Additionally, for future data collection, including additional variables might also help expand the findings in this area. As Tone and Tully (2014) indicated in their review article, various intraindividual and interindividual factors might play direct or indirect roles in affecting individual development of empathy and internalizing problems, such as depression. Thus, as they suggested, family dynamics, exposure to others' negative affect, genetic predisposition to affect regulation difficulties (e.g., 5-HTTLPR), and stronger physiological arousal in stressful situations could be some interesting directions to investigate. With that being said, neurobiological and genetic research designs should be considered to unravel the links among these variables.

## **Conclusion**

In this study, we demonstrated the direct effect of SPS temperamental characteristics on depression and empathic personal distress. Higher levels of SPS

temperaments predicted greater risks of developing depression and empathic personal distress. The findings from the present study also provided evidence of the association between parenting and depression, where a more positive parenting environment served as a protective factor for depression. However, the parenting environment did not moderate the relation between SPS and depression or the relation between SPS and empathic personal distress, nor there was a moderated mediation relation to explain the associations among these variables. Finally, empathic personal distress did mediate the relation between SPS temperament characteristics and depression, which had not been explicitly demonstrated previously.

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Table 1.

*Means and Standard Deviations of Study Variables*

<b>Variable</b>	<b><i>M</i></b>	<b><i>SD</i></b>	<b><i>Range</i></b>
Ease of Excitation (EOE)	4.66	0.88	5.25
Low Sensory Threshold (LST)	3.87	1.44	6.00
Empathic Personal Distress	2.57	0.78	3.83
Depression	0	0.87	4.94
Parenting Environment	-0.03	0.86	4.23

*Note:* The composite depression and parenting environment scores were computed by averaging their standardized subscale scores.

Table 2.

*Correlations between Study Variables*

	1	2	3	4	5
1. EOE	1.00				
2. LST	0.49**	1.00			
3. Empathic Personal Distress	0.48**	0.24**	1.00		
4. Depression	0.46**	0.32**	0.41**	1.00	
5. Parenting Environment	-0.15**	-0.19**	-0.08*	-0.20**	1.00

*Note:* \*  $p < .05$ , \*\*  $p < .01$ .

Table 3.

*Correlations among Age, Gender, and Study Variables*

	Age	Gender
EOE	-0.16**	0.18**
LST	-0.08*	0.11**
Empathetic Personal Distress	-0.21**	0.11**
Parenting Environment	-0.05	0.01

*Note:* \*  $p < .05$ , \*\*  $p < .01$ .

Table 4.

*Regression Coefficients for Moderation Analyses: Hypothesis 1*

<b>Variable</b>	<b><i>B</i></b>	<b><i>SE<sub>B</sub></i></b>	<b><i>p</i></b>
Constant	0.01	0.03	0.74
EOE	0.43	0.04	<.001
Parenting Environment	-0.14	0.04	<.001
EOE * Parenting Environment	0.02	0.04	.55
Constant	0.01	0.03	.86
LST	0.17	0.02	<.001
Parenting Environment	-0.15	0.04	<.001
LST * Parenting Environment	-0.01	0.02	.77

*Note:* Depression is the dependent variable.

Table 5.

*Regression Coefficients for Moderation Analyses: Hypothesis 2*

<b>Variable</b>	<b><i>B</i></b>	<b><i>SE<sub>B</sub></i></b>	<b><i>p</i></b>
Constant	2.57	0.03	<.001
EOE	0.41	0.03	<.001
Parenting Environment	-0.01	0.03	.80
EOE * Parenting Environment	0.02	0.03	.60
Constant	2.57	0.03	<.001
LST	0.12	0.02	<.001
Parenting Environment	-0.03	0.04	.35
LST * Parenting Environment	-0.004	0.02	.87

*Note:* Empathic personal distress is dependent variable.

Figure 1.

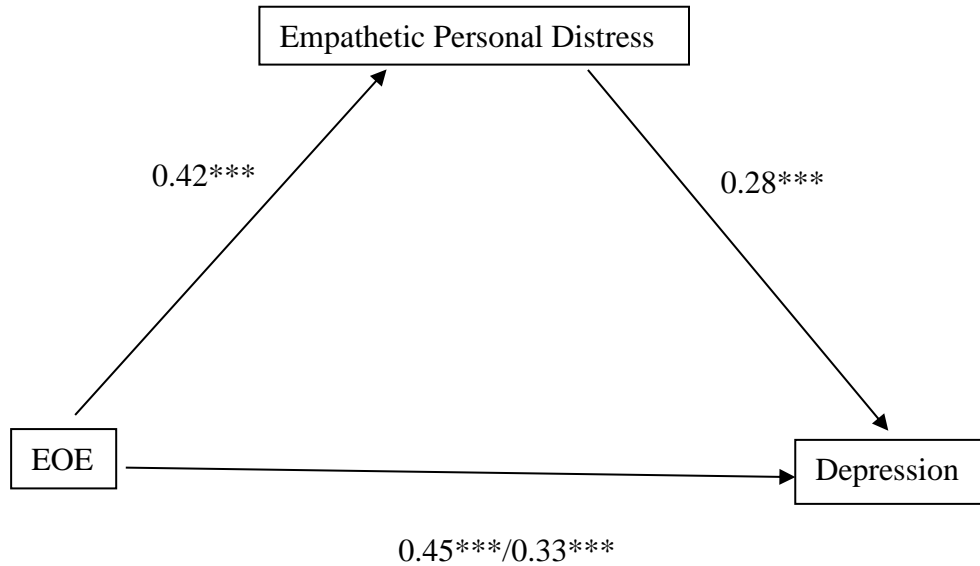


Figure 1. Direct and indirect influences of EOE on depression. The figure shows unstandardized regression coefficients.

Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Figure 2.

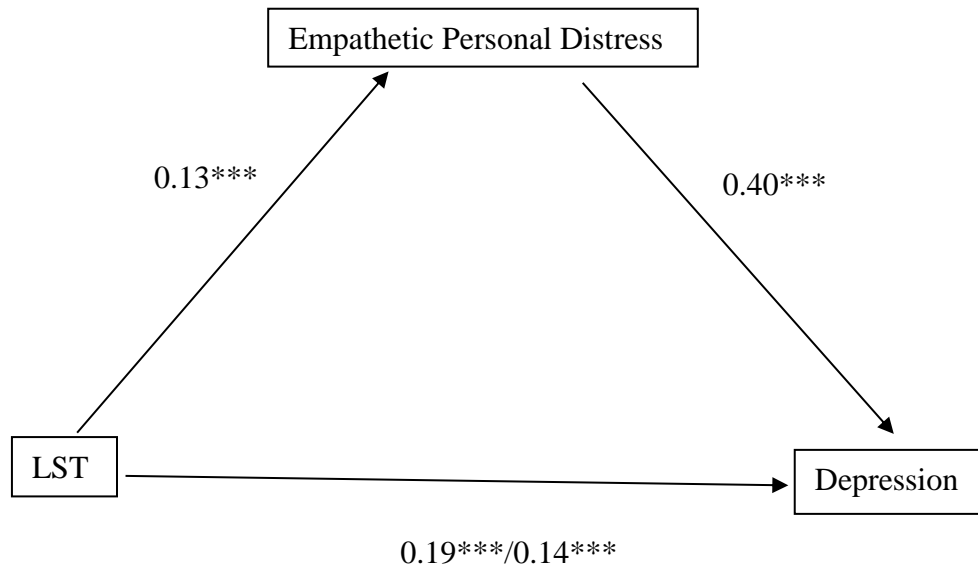
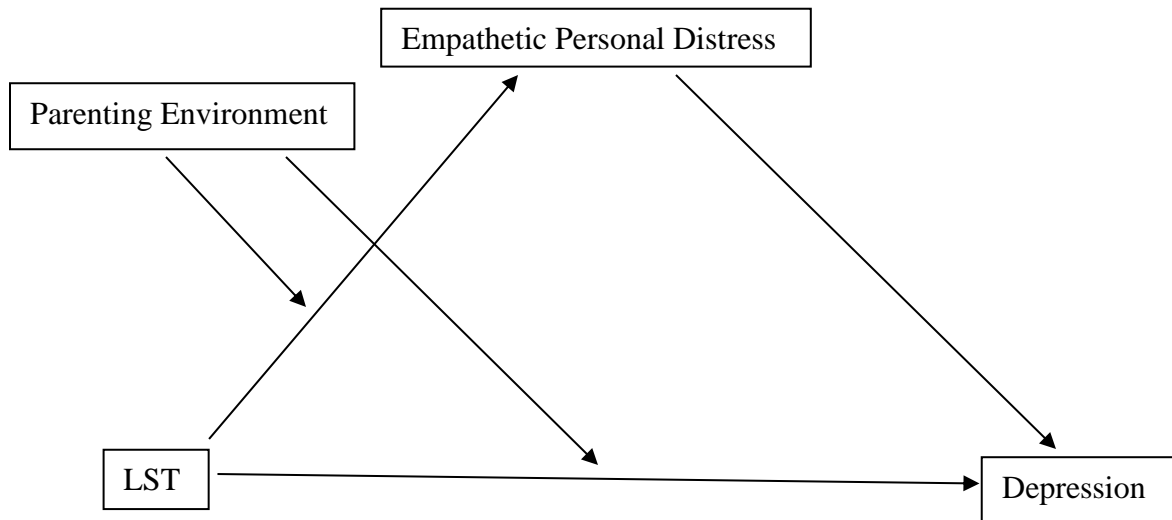


Figure 2. Direct and indirect influences of LST on depression. The figure shows unstandardized regression coefficients.

Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Figure 3.



*Figure 3. The Proposed Moderated Mediation Model.*



APPENDIX A  
IRB APPROVAL FORM

APPROVAL: EXPEDITED REVIEW

Paul Miller  
 Social and Behavioral Sciences, School of (SSBS)  
 602/543-6014  
 icpam@asu.edu

Dear Paul Miller:

On 4/10/2018 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Stress, Coping and Adaptation among Individuals with Sensitive Temperament
Investigator:	Paul Miller
IRB ID:	STUDY00008136
Category of review:	(7)(b) Social science methods, (7)(a) Behavioral research
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	<ul style="list-style-type: none"> <li>• Sensitive Temperament, coping, and adaptation, Category: IRB Protocol;</li> <li>• Recruitment letter, Category: Recruitment Materials;</li> <li>• Consent letter, Category: Consent Form;</li> <li>• Survey questionnaires for study-Qualtrics format, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);</li> </ul>

The IRB approved the protocol from 4/10/2018 to 4/9/2019 inclusive. Three weeks before 4/9/2019 you are to submit a completed Continuing Review application and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 4/9/2019 approval of this protocol expires on that date. When consent is appropriate, you must use final, watermarked versions available under the “Documents” tab in ERA-IRB.

In conducting this protocol, you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc:

Kathleen Coast  
Wenxi Yang

APPENDIX B  
STUDY QUESTIONNAIRES

### **Empathetic Personal Distress Questionnaire (IRI)**

The following statements inquire about your thoughts and feelings in a variety of situations. For each item, indicate how well it describes you by choosing the appropriate option from: “Describes me very well” to “Does not describe me very well”, using the following scale:

1 (Does not describe me very well)    2    3    4    5 (Describes me very well)

1. In emergency situations, I feel apprehensive and ill-at-ease.
2. I sometimes feel helpless when I am in the middle of a very emotional situation.
3. When I see someone get hurt, I tend to remain calm.
4. Being in a tense emotional situation scares me.
5. I tend to lose control during emergencies.
6. When I see someone who badly needs help in an emergency, I go to pieces.

## Temperament Questionnaire (HSPP)

Following is a series of statements that individuals can use to describe themselves. There are no correct or incorrect answers. All people are unique and different, and it is these differences we are trying to learn about. Please read the wording of each statement carefully and give your best estimate of how well it describes you. Indicate how well a given statement describes you from extremely untrue to extremely true.

1 (Extremely untrue)   2   3   4   5   6   7 (Extremely True)

7. Are you easily overwhelmed by strong sensory input?
8. Do you seem to be aware of subtleties in your environment?
9. Do other people's moods affect you?
10. Do you tend to be more sensitive to pain?
11. Do you find yourself needing to withdraw during busy days, into bed or into a darkened room or any place where you can have some privacy and relief from stimulation?
12. Are you particularly sensitive to the effects of caffeine?
13. Are you easily overwhelmed by things like bright lights, strong smells, coarse fabrics, or sirens close by?
14. Do you have a rich, complex inner life?
15. Are you made uncomfortable by loud noises?
16. Are you deeply moved by the arts or music?
17. Does your nervous system sometimes feel so frazzled that you just have to go off by yourself?
18. Are you conscientious?
19. Do you startle easily?
20. When people are uncomfortable in a physical environment do you tend to know what

needs to be done to make it more comfortable (like changing the lighting or the seating)?

21. Are you annoyed when people try to get you to do too many things at once?
22. Do you try hard to avoid making mistakes or forgetting things?
23. Do you make a point to avoid violent movies and TV shows?
24. Do you become unpleasantly aroused when a lot is going on around you?
25. Does being very hungry create a strong reaction in you, disrupting your concentration or mood?
26. Do changes in your life shake you up?
27. Do you notice and enjoy delicate or fine scents, tastes, sounds, works of art?
28. Do you find it unpleasant to have a lot going on at once?
29. Do you make it a high priority to arrange your life to avoid upsetting or overwhelming situations?
30. Are you bothered by intense stimuli, like loud noises or chaotic scenes?
31. When you must compete or be observed while performing a task, do you become so nervous or shaky that you do much worse than you would otherwise?
32. When you were a child, did parents or teachers seem to see you as sensitive or shy?
33. Do you get rattled when you have a lot to do in a short amount of time?

## Depression Questionnaire (CERQ & CESD)

### *CERQ*

In face of stressful or challenging experiences, everyone has his/her own thoughts and feelings. Please carefully read each statement. Please indicate how well the statement matches your usual feelings/responses when you are facing a stressful experience from almost never to almost always.

1 (Almost Never)    2    3    4    5 (Almost Always)

1. I feel that I am the one to blame for it.
2. I feel that I am the one who is responsible for what has happened.
3. I think about the mistakes I have made in this matter.
4. I think that the cause must lie within myself.
5. I often think about how I feel about what I have experienced.
6. I am preoccupied with what I think and feel about what I have experienced.
7. I want to understand why I feel the way I do about what I have experienced.
8. I dwell upon the feelings the situation has evoked in me.
9. I often think that what I have experienced is much worse than what others have experienced.
10. I keep thinking about how terrible it is what I have experienced.
11. I often think that what I have experienced is the worst that can happen to a person.
12. I continually think how horrible the situation has been.

### *CESD*

Read each statement and then circle the appropriate answer to indicate how you generally feel. There are no right or wrong answers, just indicate how you generally feel from almost never to almost always.

1 (Almost Never)    2    3    4 (Almost Always)

1. Recently, I get bothered by things that usually don't bother me.



2. I do not feel like eating; my appetite is poor.
3. I feel that I cannot shake off the blues even with help from my family or friends.
4. I feel that I am just as good as other people.
5. I have trouble keeping my mind on what I am doing.
6. I feel depressed.
7. I feel that everything I do is an effort.
8. I feel hopeful about the future.
9. I feel like a failure.
10. I feel fearful.
11. My sleep is restless.
12. I am happy.
13. Recently, I have talked less than usual.
14. People are unfriendly.
15. I enjoy life.
16. I am a steady person
17. I have crying spells.
18. I feel sad.
19. I feel that people dislike me.
20. I cannot "get going."

## Parenting Environment Questionnaire

Choose the biological father/mother, a father/mother figure, or stepfather/mother, whom you consider had the most influence on your life. This questionnaire lists various attitudes and behaviors of parents. Please check the number as you remember your father in your first 18 years. Answer with the first thought that comes to your mind. Please use the following scale when responding:

1 (Almost Never) 2 (Seldom) 3 (Sometimes) 4 (Often) 5 (Almost Always)

1. Spoke to me in a warm and friendly voice.
2. Was affectionate to me.
3. Gave me a lot of care and attention.
4. Frequently smiled at and praised me.
5. Could cheer me up when I was sad or upset.
6. Would pay attention to my feelings when making plans to do things.
7. Would talk with me calmly no matter how difficult the issue.
8. Would seem to know when something was bothering me.
9. Did not seem to understand what I needed or wanted.
10. Would “make the time” for me even when he was really busy.
11. Would take the time to figure out what I was upset about.
12. Did not talk with me very much.
13. Made me feel like my choices and desires were less important than his.
14. Would discount or minimize things that were important to me.
15. Would show me that he enjoyed my company.
16. Made me feel close to him.
17. Made me feel like I was wanted and special to him.
18. Became frustrated or annoyed while doing something for me.

19. Was hard to feel connected to him emotionally.
20. Was patient when helping me with something I found difficult (e.g., homework).
21. Remained clam when I did something that was inconvenient for him.
22. Was impatient when I didn't get something done on time.
23. Was always telling me how I should behave.
24. Tones of voice showed annoyance, irritation, or impatience about my behavior.
25. Gave me the impression that what I did was "never quite enough."
26. Gave me the feeling that I was wrong about things I thought and felt.
27. Would tell me that I was "too sensitive."
28. Would get annoyed when I had a hard time calming down about something.
29. Would insist that I "get my feelings under control."
30. Would get irritated if I got really upset when plans changed unexpectedly.
31. Showed his dissatisfaction with me when I became distressed over minor things.
32. Understood and accepted that I was bothered by various sensations (e.g., coarse fabrics, strong smells, loud noises, etc.)
33. If I didn't get something done, he would do it for me.
34. Would pressure me to accept their choices over mine (e.g., school/clothes shopping).
35. Jumped in too quickly to help when I said I had a problem with something.
36. Would forget to ask me for my opinion before making a decision affecting me.
37. Was fearful about my getting hurt physically or emotionally.
38. Encouraged me to make my own decisions.
39. Helped me to decide things for myself.
40. Encouraged my curiosity and interest.

41. Encouraged me to try to figure something out first before helping me.