Harsh parenting and later aggression among emerging adults: moderating role of positive parenting and resting skin conductance level

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Harsh Parenting and Later Aggression among Emerging Adults: Moderating Role of Positive Parenting and Resting Skin Conductance Level

by

Li Shen Chong

A Thesis Submitted to the University at Albany,
State University of New York
in Partial Fulfillment of the Requirements for the Degree of
Master of Arts

College of Arts and Sciences
Department of Psychology
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Abstract

Parenting plays a crucial role in one’s development and well-being. The association between harsh parenting and later aggression problems is well established. However, harsh parenting may not occur in a vacuum. Harsh parenting may occur within a varying degree of positive parenting. Research has shown that positive parenting can act as a protective factor against the adverse effects of harsh parenting. Moreover, autonomic nervous system activation may moderate the effects of harsh parenting on aggressive behavior. The goal of this study was to examine whether sympathetic nervous system activity, as measured by skin conductance level (SCL), and positive parenting, moderate the link between harsh parenting and later aggressive behavior among emerging adults. Participants (N = 264, mean age = 19.37, 122 males, 142 females) reported retrospectively on experiences of harsh and positive parenting as well as current anger, hostility, verbal and physical aggression. Resting SCL was also measured. Regression analysis examined whether resting SCL, positive parenting, harsh parenting, and their interaction accounted for current physical aggression, verbal aggression, anger, and hostility. Analyses revealed that (1) a low level of resting SCL and high level of positive parenting and (2) a high level of resting SCL and low level of positive parenting, exacerbated the link between harsh parenting and anger. Moreover, a positive association was found between harsh parenting and hostility among emerging adults who exhibited high resting SCL. The results of the present study are consistent with the biological sensitivity to context theory (Ellis & Boyce, 2008), in that those with higher autonomic activity are most negatively affected by the adverse situations of high harsh parenting and low positive parenting. This study highlighted the importance to examine the interactions between biological and psychosocial mechanisms underlying emerging adult’s aggression.
Harsh Parenting and Later Aggression among Emerging Adults: Moderating Role of Positive Parenting and Resting Skin Conductance Level

Some degree of aggression is adaptive as it can promote competitiveness, competence, social assertiveness, and success in overcoming challenges in daily lives. However, excessive aggression outbursts are considered maladaptive. Maladaptive aggressive behaviors are acts that are intended to bring harm, pain, or injury to others (Zirpoli, 2008). Aggression can be manifested in different forms – behavior (e.g. physical and verbal aggression), emotion (e.g. anger), and cognition (e.g. hostility; Buss & Perry, 1992). Aggression is associated with a variety of physical and psychiatric diagnoses, such as hypertension, cardiac diseases, injuries from aggressive behaviors, conduct disorder, antisocial personality disorder and more (Hodgins, Cree, Alderton, & Mak, 2008; McCloskey, Kleabir, Berman, Chen, & Coccaro, 2010). Aggression may be particularly significant during emerging adulthood as this is the time when emerging adults start to establish complicated interpersonal relationships while navigating many stressful life transitional events (Arnett, 2000). These aggressive behaviors usually escalate to more violent and serious acts (e.g. aggressive driving, intimate partner violence, sexual assault, physical assault, homicide, etc.) during emerging adulthood.

Both biological and environmental factors appear to contribute to maladaptive aggression among emerging adults. Given the high cost of maladaptive aggression on both personal and community levels, exploring how the biological and environmental risk and protective factors impact aggression among emerging adults is important to develop effective prevention, diagnosis, and intervention strategies. The purpose of the current study is to examine whether parenting and autonomic nervous system activity independently and jointly account for the development of aggression among emerging adults.
Autonomic functioning may be critical underlying the process of aggression (Lorber, 2004). Indeed, research has consistently found autonomic functioning to be a predictor of aggressive behavior among children and adolescents (Fung et al., 2005; Scarpa et al., 2010; Schoorl, Rijin, Wied, Goozen & Swaab, 2016; van Goozen, Fairchild, Snoel, & Harold, 2007), though research on the link between autonomic functioning and aggression in emerging adults are limited. One branch of the ANS is the sympathetic nervous system (SNS). The SNS is activated in cases of stress and threat so that the body will be prepared for a “fight or flight” response as indicated by increased heart rate and oxygen flow (Boucsein, 1992). One common index of SNS functioning is the skin conductance level (SCL), the electrodermal activity caused by excitation of the sweat glands. Low SCL is a marker of fearlessness, disinhibition of aggressive impulses, sensation seeking, failure of avoidance learning, or punishment insensitive (Raine, 2002; Raine, 2005; van Goozen & Fairchild, 2008), and is associated with physical aggression (Erath et al., 2011; Gregson et al., 2014; Posthummus et al., 2009). High SCL may also represent a risk factor for aggression (Beauchaine et al., 2008; El-Skeikh, 2005; Hubbard et al., 2002). It was suggested that high SCL functioning may represent downstream effects of the central nervous system activity related to fear, hostility, and aggression (van Goozen & Fairchild, 2008). Though studies have found link between SCL levels and aggression, these studies did not distinguish between functional subtypes of aggression (i.e. physical and verbal aggression, anger, and hostility), which limits the conclusion that can be drawn regarding the impact of SCL levels on distinct functions of aggression.

The psychosocial environment likely also influences developmental outcomes. Evidence suggests that parenting behaviors can act as risk and protective factors for later aggression. According to social learning theory (Bandura, 1977), children learn and adopt certain behaviors
through modeling parents’ behaviors. Hence, repeated scenarios of parent aggressive behavior in exchange for children’s submission foster negative reinforcement and sensitization to cues of imminent conflicts among children (Cummings & Davies, 1994; Patterson, 2002). The link between harsh parenting practices (e.g. corporal punishment, physical discipline, psychological control, verbal aggression, etc.) and aggressive behaviors has been replicated in numerous studies, including cross-sectional, longitudinal, and intervention studies (Gershoff, 2002; Patterson, 2002; Pettit & Arsiwalla, 2008). However, harsh parenting may not occur in a vacuum. Some parents who engage in harsh parenting strategies may exhibit positive parenting behaviors as well, whereas others may be more constrained in their positive behaviors. Research has shown positive parenting behaviors to be protective against aggression (Deater-Deckard, Ivy, & Petril, 2006; Holtrop, Smith, & Scott, 2015; McKee et al., 2007). Examples of positive parenting behaviors are parental monitoring, parental involvement, parental warmth, non-coercive discipline, and skill encouragement. These positive parenting behaviors have also been found to moderate the adverse effects of harsh parenting (Kotchick & Forehand, 2002, Mrug, Elliot, Gilliland, Grunbaum, Tortolero, Cuccaro, & Schuster, 2008).

Beyond examining independent contributions of autonomic functioning and parenting experiences, considering the potential interactive effects of these factors is important in understanding the manifestation of later aggression. Boyce and Ellis (2005) proposed the Biological Sensitivity to Context theory such that individuals have different susceptibilities to environmental influence in a “for better or for worse” manner. Their susceptibilities depend on their stress response systems. This theoretical model contends that heightened exposure to early stress promotes the up-regulation of stress reactivity and improves one’s capacity to detect and respond to threat in the environment; heightened exposure to nurturing and enriching
environments also promote up-regulation of stress-reactivity and improves one’s capacity to benefit from additional environmental resources and support. Conversely, an individual who has neither exposure to highly adverse or highly nurturing social context are thought to down-regulate their stress reactivity to protect them against environmental stressors. Thus, individuals with high biological sensitivity to context (high physiological stress reactivity) are more vulnerable to adverse environments, but also more susceptible to benefit from positive environmental influences. In accordance with this paper, sensitivity to context may influence the risk for later aggression among emerging adults under adverse environments (i.e. harsh parenting) and positive environmental setting (i.e. positive parenting).

Several studies have further examined how SNS functioning interacts with parenting practices to influence aggression. Kassing, Lochman, and Glenn (2018) found a significant two-way interaction between basal SCL and inconsistent parenting practices in predicting proactive, unprovoked instrumental aggression among fourth-grader children. Children with high resting SCL who experienced highly inconsistent parenting practices were more likely to engage in proactive aggression. In addition, Wagner and Abaied (2016) examined the moderating role of SCL reactivity to a discussion of a stressful interpersonal experience on the link between parental psychological control and relational aggression among emerging adults. Parental psychological control was associated with reactive relational aggression only among participants who exhibited high levels of SCL reactivity. In contrast, parental psychological control was associated with proactive relational aggression only among participants who have low levels of SCL reactivity. However, studies looking into these interactions have focused on aversive parenting practices. No study has yet to investigate the interaction between autonomic functioning and positive parenting and when accounting for later aggression among emerging adults.
This study aims to examine whether SNS activity, as measured by SCL, and positive parenting moderate the link between harsh parenting and later aggressive behavior among emerging adults. It was hypothesized that either low or high level of SCL and low levels of positive parenting will increase the adverse effect of harsh parenting on later aggression. Harsh parenting experiences directed at individuals with low levels of SCL may be ineffective as they are under-aroused under aversive conditions. Thus, harsh parenting may not serve to curb their negative behavior, leading to increased aggression as they develop. Individuals with high SCL may be more susceptible to the negative effects of harsh parenting, providing an alternative path of impact for harsh parenting on aggressive behavior. High levels of positive parenting may be protective against the adverse effects of harsh parenting, whereas low levels of positive parenting may exacerbate the adverse effects of harsh parenting. This study will help elucidate a more complex picture of how parenting affects children, to help better understanding when harsh parenting experiences are most likely to relate to aggression. Moreover, it is possible to explicate when the links are the strongest by examining the three-way interaction between autonomic functioning, positive and harsh parenting experience on later aggression. Developing a stronger understanding of the interactive effects of different risk factors may be informative in the development of impactful and effective prevention and intervention strategies.

Methods

Participants and Procedure

This study combined data collected across three different undergraduate subject pool studies. The same measures were used and administered in a consistent manner across all three studies. The Institutional Review Board (IRB) at the University at Albany, State University of
New York, approved each study protocol. Participants included 264 undergraduates (122 males, 142 females) with a mean age of 19.37 years (SD=1.84). Ethnic composition was 67% White, 15% Black, 9% Hispanic, 4% Asian, and 5% biracial or other. Participants were recruited through the university department of psychology research pool sign-up website. Exclusion criteria included severe mental and physical illness and substance abuse. Upon participation, participants signed a written informed consent and received course credits as compensation for participation. Participants were instructed not to consume any caffeine products, such as soda or coffee, and not to smoke within 2 hours of their lab visit. After completion of the consent procedure, participants retrospectively reported their parenting experiences and self-reported their current aggression, hostility and anger. Then, they were connected to with physiological equipment. After a 5-minute accommodation period, their resting SCL were recorded for 5 minutes. Detail of each measure are described below.

**Measures**

**Parent-Child Conflict Tactics Scale** (CTSPC; Straus, Hamby, Finkelhor, Moore & Runyan, 1998). Participants retrospectively self-reported their experiences regarding how their parents responded to their behavior before 13 years old using the CTSPC. CTSPC has 22 items that assessed parent’s non-violent discipline, psychological aggression, and physical assault. Constructive, non-violent discipline strategies (e.g. time out, explaining to child why he or she did something wrong) are referred as “positive parenting,” whereas psychological aggression and physical assault are referred as “harsh parenting” in this paper. Physical assault scale includes minor assault (e.g. corporal punishment), severe assault (e.g. physical maltreatment), and very severe assault (e.g. severe physical assault). All items were rated based on scores of ‘0’ to ‘4’,
ranging from ‘never occurred to me’ to ‘occurred very often to me’. The reliability and validity of this measure were documented (Knox, Burkhart, & Cromly, 2012; Straus et al., 1998).

**The Aggression Questionnaire** (AQ; Buss & Perry, 1992). The AQ is a self-report questionnaire that uses a five-point Likert scale to assess current physical aggression, verbal aggression, hostility, and anger. This commonly used measure has wealth evidence of reliability and validity (Harris, 1997; Gerevich, Bacskai, & Czobor, 2007). Buss and Perry (1992) report reliability coefficient alphas as follow: physical aggression, 0.85; verbal aggression, 0.72; anger, 0.83; hostility, 0.77, and total score = 0.89. In my sample, the variables also have considerable internal consistency with alphas as follow: physical aggression, 0.82; verbal aggression, 0.77; anger, 0.84; hostility, 0.76, and total score = 0.81.

**Resting SCL.** Two Ag/AgCl electrodes filled with isotonic citrate salt electrode gel were attached to the volar surfaces of the distal phalanges of the participant’s non-dominant hand. A bio amplifier (James Long Company, Caroga Lake, NY) recorded the resting SCL activity continuously for 300 seconds (5-minutes). The bio amplifier used a 500mV, 30Hz sinusoidal excited waveform, and produced SCL output of 10μS/V. The A/D converter was of 16-bit resolution and ± 2.5 V input range. All data were digitized at 1kHz. The average SCL during the first five minutes were calculated.

**Results**

Table 1 provides descriptive information on participant characteristics, self-reported parenting experiences, resting SCL, and current aggression. Due to substantial skewness in positive parenting, harsh parenting, and resting SCL, I winzorised these variables to three standard deviations and then standardized them for all analyses, though Table 1 displays raw
means. Pearson correlations examined relations among positive and harsh parenting, resting SCL, and types of aggression (see Table 2). Positive parenting is significantly correlated with harsh parenting \((r = 0.18)\) and resting SCL \((r = 0.20)\), whereas harsh parenting experiences were significantly correlated with physical aggression \((r = 0.19)\), anger \((r = 0.14)\), and hostility \((r = 0.14)\).

Regression analyses examined whether resting SCL, positive parenting, harsh parenting, and their two- and three-way interaction effects accounted for current anger, hostility, physical aggression, and verbal aggression (see Table 3). Consistent with other findings (Anderson & McNeil., 1991, Kredlow et al., 2017), black participants in this study displayed significantly lower SCL compared to non-black participants. Hence, all regression analyses controlled for ethnicity \((-1 = \text{White/Hispanic/Asian/Others}, +1 = \text{Black})\). For the equation accounting for anger, the overall F-value was significant, with predictors accounting for 7% of the variance. A significant main effect emerged for harsh parenting, and a significant three-way interaction also emerged between resting SCL, positive parenting, and harsh parenting on anger \((\beta = -0.16, t(239) = -2.32, p = 0.021)\). The three-way interaction was probed as the highest order effect. Probing of the 3-way interaction according to procedures recommended by Aiken and West (1991) revealed that at conditional values of 1 standard deviation (SD) below the mean on resting SCL and 1SD above the mean on positive parenting, the slope of the relation between harsh parenting and anger was significant \((\beta = 0.29, t(234) = 2.18, p = 0.03; \text{see Figure 1})\). At conditional values of 1SD above the mean on resting SCL and 1SD below the mean on positive parenting, the slope of the relation between harsh parenting and anger was significant \((\beta = 0.40, t(234) = 2.71, p = 0.007; \text{see Figure 1})\). However, at conditional value of 1 SD above the mean on resting SCL and 1 SD above positive parenting, the relationship between harsh parenting and
anger was not significant ($\beta = 0.34$, $t(234) = 0.46$, $p = 0.65$). The relationship between harsh parenting and anger was also not significant at conditional values of 1 SD below the mean on resting SCL and 1 SD below the mean on positive parenting ($\beta = 0.43$, $t(234) = 0.74$, $p = 0.46$).

In addition, the total equation accounting for hostility was significant, with predictors accounting for 9% of the variance. A significant main effect for harsh parenting and two significant two-way interactions were found for harsh parenting x resting SCL ($\beta = -0.15$, $t(234) = -2.23$, $p = 0.03$) and positive parenting x resting SCL ($\beta = 0.14$, $t(234) = 2.21$, $p = 0.03$). The main effect was interpreted in light of the two-way interaction. Test of simple slopes suggested that at conditional values of 1SD above the mean on resting SCL, the relation between harsh parenting and hostility was significant ($\beta = 0.30$, $t(244) = 3.19$, $p = 0.002$) but at values of resting SCL 1SD below the mean, the relation was null ($\beta = 0.06$, $t(244) = 0.70$, $p = 0.49$; see Figure 2). The relation between positive parenting and hostility was null at both conditional values of 1SD above ($\beta = -0.15$, $t(247) = -1.55$, $p = 0.12$) or below ($\beta = 0.094$, $t(247) = 0.1.190$, $p = 0.24$) the mean on resting SCL (see Figure 3). A marginally significant three-way interaction was also found for positive parenting x harsh parenting and resting SCL on hostility.

The total equation accounting for physical aggression was significant, with predictors accounting for 7% of the variance. The main effect of harsh parenting was significant for physical aggression ($\beta = -0.25$, $t(235) = 3.68$, $p \leq 0.001$). Lastly, the equation accounting for verbal aggression was not significant. However, a significant main effect of resting SCL ($\beta = 138$, $t(235) = 2.02$, $p = 0.04$) and a marginally significant three-way interaction between SCL, positive parenting, and harsh parenting accounted for verbal aggression were found.

**Discussion**
Understanding the complexity of aggression and reducing aggressive behaviors across development have always been important goals of both scientific research and public policy. Exploring aggression during emerging adulthood, a period of changes in risk-taking tendencies, identity formation and personality (Arnett, 2000; Nelson and Barry, 2005), is very relevant. Much remains unclear as to why some emerging adults are more likely to exhibit different subtypes of aggression compared to others. From research conducted with children and adolescents, parenting and psychophysiology play important roles in influencing aggressive behaviors (Murray-Close, 2013). Indeed, recent literature has emphasized the long-lasting effects of parenting on emerging adult developmental outcomes (Abaied, Wagner, & Sanders, 2014; Paddilla-Walker, Nelson, & Knap, 2014). The goal of this study was to investigate the interactive contributions of SNS, indexed by resting SCL, positive and negative parenting practices to physical aggression, verbal aggression, hostility and anger among emerging adults. This is the first study to examine the three-way interaction between positive parenting and autonomic functioning when accounting for later aggression among emerging adults.

In general, this study found that SNS functioning and positive parenting have moderating effects on the link between harsh parenting and aggression among emerging adults, with findings varying by type of aggressive behavior. The findings revealed a significant three-way interaction effect among SNS functioning, positive parenting, and harsh parenting on anger. The relation between harsh parenting and anger was significant at either (1) low level of resting SCL and high level of positive parenting or (2) high level of resting SCL and low level of positive parenting. Harsh parenting is significantly positively related to hostility at higher but not lower values of resting SCL. I have yet to find any significant moderating effects of resting SCL or positive parenting on the relation between harsh parenting on physical and verbal aggression. The
findings suggest that although harsh parenting increases the risk for the development of aggression, the SNS functioning of emerging adults and their positive parenting experiences help influence the effect of harsh parenting on current anger and hostility levels.

The findings of this study are partially consistent with my hypotheses. As hypothesized, harsh parenting was positively associated with anger among emerging adults who displayed high values of resting SCL and low values of positive parenting experiences. The SNS activates in response to a threat, stress, or challenge by marshaling our body’s physiological resources for either defensive (‘fight’) or escape (‘flight’) behaviors. However, under situations of hyperarousal or hypersensitivity of SNS (i.e. high SCL), one can exhibit increased emotional reactivity and anger (Scarpa & Raine, 1977). In this study, the risk of high SNS increased when coupled with an aversive psychosocial environment (i.e. high harsh parenting and low positive parenting). Individuals with high SCL are more likely to react negatively to aversive parenting behaviors due to heightened defensiveness to the stress of interpersonal conflict. Low positive parenting might further aggravate these aggressive behaviors learned from the coercive parent-child exchanges. In contrast, high SCL seems to be relatively adaptive in a positive environment. Diamond, Fagundes, and Cribbets (2012) found that high SCL among adolescents coupled with low internalizing symptoms among mothers predicted the best emotional adjustment, whereas high SCL among adolescents coupled with mothers with high internalizing symptoms predicted elevated negative affect. In this study, emerging adults at high values of resting SCL under conditions of low values of harsh parenting and low values of positive parenting exhibited the least anger manifestation. Overall, this finding is consistent with the biological sensitivity to context theory (Ellis & Boyce, 2008). Those with higher SNS
functioning are most negatively affected by the adverse situation of higher harsh parenting and lower positive parenting and most susceptible to benefit from positive environmental influences.

Inconsistent with the hypotheses, harsh parenting was positively associated with anger among emerging adults who displayed low value of resting SCL and high values of positive parenting experiences. Research has found evidence for the link between low SCL and aggression, though the link was found strongest with physical and proactive aggression (Hubbard et al., 2002; Scarpa & Raine, 1997). Given that anger expression is associated with physical aggression and relational aggression (Ersan, 2020), findings from this study further extends this work as a similar physiological profile for individuals who endorse high levels of anger was found. Consistent with previous research, emerging adults with low resting SCL and high harsh parenting experiences are more likely to be aggressive. However, high levels of positive parenting do not help mitigate the effects of harsh parenting on anger were shown in the results of this study. In other words, positive parenting does not compensate for the social learning effects of aggression among emerging adults with low SNS functioning. It is plausible that the coupling effects of fearlessness, disinhibition, and poor ability to regulate emotion among individuals with low SNS function may therefore decrease their ability to learn through both positive and negative reinforcement. The findings suggest that low SCL may be a more potent risk factor than high SCL in exacerbating the negative effects of harsh parenting on anger, as high degrees of positive parenting amidst high degrees of harsh parenting have no protective effects.

The findings revealed that high resting SCL in the context of harsh parenting is associated with hostility behaviors. Hyperarousal of SNS functioning prompts emerging adults to report more hostility because of the heightened “flight and fight” response. Furthermore, main
effects of harsh parenting on anger, hostility, and physical aggression, but not verbal aggression were found. It was surprised that harsh parenting experiences do not predict verbal aggression, which would suggest that there might be variability among harsh parenting practices (physical vs. verbal aggression from parents) among this sample. However, social learning or modeling is not simple mimicry of other’s acts (Bandura, 1989). Individuals may have different aggression manifestation based on the context they are in (Kawabata, Alink, Tseng, van Ijzendoorn, & Crick, 2011). Given that the study sample consisted of emerging adults who are developing relationships with peer and romantic partners (Arnett, 2015), their increased focus on maintaining mature relationships might impede their usage of verbal aggression. In addition, resting SCL did not relate to aggressive behavior as a main effect or in two-way interactions with harsh parenting except for a significant main effect on verbal aggression and a significant two-way interaction with harsh parenting on hostility. Different indexes of autonomic functioning may have different impacts on aggression, hostility and anger among emerging adults. For example, resting SCL was found to be linked with proactive aggression among females, whereas reactive SCL was found to be positively linked to reactive aggression and negatively linked to proactive aggression among males (Armstrong, Wells, Boisvert, Lewis, Cooke, Woeckner, & Kavish, 2019). The effects of resting SCL may be further moderated by gender, hence explained the lack of significant effects in this study.

The present study contributes novel findings to the psychophysiological literature by examining how different parenting practices interact with SNS to account for emerging adult adjustment. As shown from the results, differential developmental outcomes arise as the autonomic functioning interacts with environmental variables. Although physical and verbal aggression, hostility and anger were all correlated in the present study, regression analyses still
indicated differences in how parenting and psychophysiology accounted for them. Therefore, considering different contexts when examining the adverse effects of harsh parenting on physical aggression, verbal aggression, hostility and anger is very important.

The results of this study can be conceptualized from a biosocial interaction perspective. Consistent with Liu’s (2004) biosocial interaction model of externalizing behaviors, developmental outcomes of externalizing behaviors result from a reciprocal relationship between biological and psychosocial risk factors. In accordance with this study, the interactive effect in this model assumes a combinative (multiplicative) interaction between both types of risk factors would predict a higher likelihood of later aggression.

This is the first study to examine the moderating role of SNS functioning and positive parenting on the relation between harsh parenting and aggression. To my knowledge, this study is also the first to examine the interaction between both positive and negative aspects of parenting and SNS, and one of the few to investigate these processes among emerging adulthood (see Abaied 2015; Abaied et al., 2014; Wagner & Abaied, 2016). Most studies have focused on childhood, middle childhood, and adolescence (Diamond et al., 2012; El-Skeikh, Keller, & Erath, 2007; Erath, El-Skiekh, Hinnant, & Cummings, 2009; Gordis, Feres, Olezeski, Rabkin, & Trickett, 2010; Kochanska, Brock, Chen, Aksan, & Anderson, 2015). In contrast, research on emerging adulthood were heavily focused on relational aggression and rarely explore the role of parental contributions. The results from this study, along with others’ have emphasized the importance of continuing to explore how biology and environmental factors interact with each other to influence the emerging adult developmental outcome.

Several limitations should be considered in this study. First, parenting experiences reported are based on retrospective self-report. Aggressive participants maybe biased towards
remembering or reporting that they have been involved in more parent-child conflicts than the non-aggressive participants. Moreover, the relationship between parenting and offspring’s aggression is bidirectional (O’Connor, 2002; Larsson Viding, Rijsdijk, & Plomin, 2008). Children who display aggressive behavior may elicit negative parental reaction; children may also display aggressive behavior reacting to aversive parenting practices. Additionally, the participant’s current aggression was self-reported, and it is likely to be influenced by social desirability. Collecting more collateral reports on both parenting experiences and current aggression can preclude self-report biases. Further, this study also has an implicit assumption that parenting practices have the same effects on all groups of children. In contrast, the ethnic or cultural context may affect the meaning of certain parenting behaviors and their impact on later aggression (Deater-Deckard & Dodge, 1997; Lansford et al., 2005; Polaha et al., 2004). Therefore, future studies should also collect information regarding a child’s perception of parental warmth or control in response to parenting behavior in the analyses. Another limitation is that this study only included anger, hostility, physical and verbal aggression. Given the biosocial interaction are likely to produce different outcome among different subtypes of aggression and the prevalence of relational aggression among emerging adults, future work should include more subtypes of aggression when considering the moderating role of parental contribution and psychophysiological measures.

A further limitation is that this study included only the resting index of SNS functioning. Future studies should include both basal and reactive SNS functioning, as these are complementary yet contrasting aspects of the same issue. Having a stronger basis of literature that directly compares the two could contribute meaningful information to the understanding of autonomic regulation. Current literature measuring basal levels of SNS functioning is
inconsistent regarding how long these measures were assessed. A gold standard for measuring autonomic functioning would be helpful when comparing results from different studies. Other measures that index SNS autonomic functioning, such as pre-ejection period (PEP), should also be examined to replicate the current findings and develop convergent evidence regarding the role of the SNS in the development of aggressive behavior. In addition, the design of this study is retrospective and correlational, and thus I cannot deduce causality. Ineffective parenting practices may or may not have truly preceded the aggression, and I cannot rule out gene-environment correlations. Moreover, the relationship between autonomic functioning, parenting practices, and later aggression is likely to be reciprocal. Furthermore, it is possible that other moderators might be involved. Gender has been found to moderate the link between autonomic functioning, childhood maltreatment, and aggression-related behavior among children (Erath et al., 2011; Gordis et al., 2010; Hinnant, Erath & El-Skeikh, 2015). The gender differences may be due to the inherent sex difference in the presentation of aggression among males and females (Campbell, 2007; Tieger, 1980).

Lastly, the findings from this study are conceptualized from an emerging adulthood developmental perspective, a period of feeling “in-between” adolescence and adulthood (Arnett, 2000). In the period between age 18 years to the mid-twenties, emerging adults are often gaining education and training or joining the workforce, establishing a residence, and starting a career (Arnett, 2000). While emerging adults are trying to seek personal and financial independence from their parents, many parents still feel the need to help their children to navigate this period of identity exploration as they do not consider their children as adults yet (Nelson et al., 2007). Most work has found the link between early parenting (through retrospective reporting) and subsequent outcomes in emerging adulthood, not many studies look into how parenting in
emerging adulthood may influence emerging adults’ behavioral outcomes. Given that there might be changes in the parent-child dyad during emerging adulthood along with different life transitions (Aquilino, 2006; Buhl, 2007), future work should explore the role of some common emerging adult parenting practices (e.g. uninvolved, controlling-indulgent, and authoritative [Nelson, Padilla-Walker, Christensen, Evans, & Carroll, 2011]) and physiological measures in influencing aggression among emerging adults.

Conclusion

In general, the manifestation of hostility, anger, physical, and verbal aggression may depend on SNS functioning and parenting practices. Emerging adults who have either (1) low level of resting SCL and high level of positive parenting or (2) high level of resting SCL and low level of positive parenting experience more adverse effects of harsh parenting on anger. Arousal patterns in children who exhibit aggressive behavior are complex and cannot be explained through a “one size fits all” approach – autonomic under-arousal and hyperarousal can each be potential risk or protective factors. Moreover, parenting practices remain influential on emerging adult’s behavioral outcomes, but the effects of different parenting practices vary across individuals. Although positive parenting can be protective against the effects of harsh parenting, the protective effects are conditional to an individual’s autonomic profile. In general, parents are advised to reduce harsh parenting practices and to increase positive parenting practices to foster and model healthier interpersonal relationships and behavior among their children. Continuous effort to consider the interaction effects of SNS functioning future research will be helpful in the development and implementation of prevention strategies, as autonomic functioning (SNS and PNS) are considered as predictors of psychotherapy and parenting intervention in some
evidence-based treatment research for aggression-related problems (Bagner, Graziano, Jaccard, Sheinkopf, Vohr, & Lester, 2012; Beauchaine et al., 2013).

Despite the limitations, the findings of this study are consistent with the idea that biosocial interactions influence later aggression among emerging adults. A more comprehensive understanding of how biological and environmental psychosocial factors interact to predict aggression helps to inform prevention and intervention strategies. Specific targeted interventions can be developed to treat individuals with different levels of autonomic functioning and family environments. For example, individuals can be screened based on their autonomic activation and their experience of parenting behaviors to capture at-risk individuals and to provide them with more effective intervention targeting, for example SNS and emotion regulation.
Reference


anger: Relations to reactive versus proactive aggression. *Child Development, 73*, 1101–1118


Table 1. Sample Characteristics

<table>
<thead>
<tr>
<th>Variables (N=264)</th>
<th>Mean, (SD)</th>
<th>Range</th>
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<tr>
<td>Age (years)</td>
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<td>Sex (% female)</td>
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<td>0.72 – 23.24</td>
</tr>
<tr>
<td>BP Physical Aggression</td>
<td>23.09 (8.58)</td>
<td>8 – 45</td>
</tr>
<tr>
<td>BP Verbal Aggression</td>
<td>15.82 (3.94)</td>
<td>5 – 25</td>
</tr>
<tr>
<td>BP Anger</td>
<td>17.52 (5.83)</td>
<td>7 – 33</td>
</tr>
<tr>
<td>BP Hostility</td>
<td>22.70 (6.90)</td>
<td>8 – 39</td>
</tr>
</tbody>
</table>

Note: CTS = Conflict Tactics Scale; SCL = Skin conductance level; BP= Buss Perry.
Table 2. Bivariate correlation between types of aggression, resting SCL, positive and harsh parenting.

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CTS Positive Parenting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. CTS Total Harsh Parenting</td>
<td>0.18*</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3. Resting SCL</td>
<td>0.20*</td>
<td>0.004</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. BP Physical Aggression</td>
<td>-0.08</td>
<td>0.19**</td>
<td>0.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. BP Verbal Aggression</td>
<td>0.04</td>
<td>0.09</td>
<td>0.09</td>
<td>0.56**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. BP Anger</td>
<td>-0.06</td>
<td>0.14*</td>
<td>0.12*</td>
<td>0.679**</td>
<td>0.55**</td>
<td></td>
</tr>
<tr>
<td>7. BP Hostility</td>
<td>0.01</td>
<td>0.14*</td>
<td>0.03</td>
<td>0.41**</td>
<td>0.38**</td>
<td>0.53**</td>
</tr>
</tbody>
</table>

Note: ** p ≤ 0.01; * p ≤ 0.05; CTS = Conflict Tactics Scale; SCL = Skin conductance level; BP = Buss Perry.
Table 3. Regression equations accounting for aggression from resting SCL, positive parenting, harsh parenting, and their interactions.

<table>
<thead>
<tr>
<th></th>
<th>β</th>
<th>t</th>
<th>F</th>
<th>R²</th>
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<tbody>
<tr>
<td><strong>Anger</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Model</td>
<td></td>
<td></td>
<td>2.07*</td>
<td>0.07</td>
</tr>
<tr>
<td>Resting SCL</td>
<td>0.13</td>
<td>1.86*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Parenting</td>
<td>-0.11</td>
<td>-1.69*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harsh Parenting</td>
<td>0.21</td>
<td>3.07**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Parenting x Harsh Parenting</td>
<td>0.03</td>
<td>0.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Parenting x Resting SCL</td>
<td>0.02</td>
<td>0.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harsh Parenting x Resting SCL</td>
<td>-0.02</td>
<td>-0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Parenting x Harsh Parenting x Resting SCL</td>
<td>-0.16</td>
<td>-2.31*</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hostility</strong></td>
<td></td>
<td></td>
<td>2.96**</td>
<td>0.10</td>
</tr>
<tr>
<td>Total Model</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resting SCL</td>
<td>0.05</td>
<td>0.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Parenting</td>
<td>-0.04</td>
<td>-0.65</td>
<td></td>
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</tr>
<tr>
<td>HarshParenting</td>
<td>0.23</td>
<td>3.45**</td>
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</tr>
<tr>
<td>Positive Parenting x Harsh Parenting</td>
<td>0.03</td>
<td>0.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Parenting x Resting SCL</td>
<td>0.14</td>
<td>2.21*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harsh Parenting x Resting SCL</td>
<td>-0.15</td>
<td>-2.23*</td>
<td></td>
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<tr>
<td>Positive Parenting x Harsh Parenting x Resting SCL</td>
<td>-0.12</td>
<td>-1.76*</td>
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</tr>
<tr>
<td><strong>Physical Aggression</strong></td>
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<td>2.22*</td>
<td>0.07</td>
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<tr>
<td>Total Model</td>
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<td></td>
</tr>
<tr>
<td>Resting SCL</td>
<td>0.10</td>
<td>1.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Parenting</td>
<td>-0.10</td>
<td>-1.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harsh Parenting</td>
<td>0.25</td>
<td>3.79**</td>
<td></td>
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<tr>
<td>Positive Parenting x Harsh Parenting</td>
<td>-0.06</td>
<td>-0.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Parenting x Resting SCL</td>
<td>-0.02</td>
<td>-0.33</td>
<td></td>
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</tr>
<tr>
<td>Harsh Parenting x Resting SCL</td>
<td>0.01</td>
<td>-0.16</td>
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<tr>
<td>Positive Parenting x Harsh Parenting x Resting SCL</td>
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<td>-0.88</td>
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<tr>
<td><strong>Verbal Aggression</strong></td>
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<td>1.49</td>
<td>0.05</td>
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<tr>
<td>Total Model</td>
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</tr>
<tr>
<td>Resting SCL</td>
<td>0.15</td>
<td>2.11*</td>
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<tr>
<td>Positive Parenting</td>
<td>0.01</td>
<td>0.20</td>
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<tr>
<td>Harsh Parenting</td>
<td>0.11</td>
<td>1.67*</td>
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<tr>
<td>Positive Parenting x Harsh Parenting</td>
<td>0.01</td>
<td>0.14</td>
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<tr>
<td>Positive Parenting x Resting SCL</td>
<td>0.01</td>
<td>0.17</td>
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<tr>
<td>Harsh Parenting x Resting SCL</td>
<td>-0.03</td>
<td>-0.36</td>
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<tr>
<td>Positive Parenting x Harsh Parenting x Resting SCL</td>
<td>-0.14</td>
<td>-1.87*</td>
<td></td>
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</tr>
</tbody>
</table>

*Note:* ** p ≤ 0.01, * p ≤ 0.05, + p ≤ 0.10; All regression analyses were controlled for ethnicity (−1 = White/Hispanic/Asian/Others, +1 = Black).
**Figure 1.** Plot of the three-way interaction effect between positive parenting, harsh parenting, resting SCL accounting for anger.

*Note: ** p ≤ 0.01, * p ≤ 0.05,*
Figure 2. Plot of the two-way interaction effect between harsh parenting and resting SCL accounting for hostility.

Note: * p ≤ 0.05
Figure 3. Plot of the two-way interaction effect between positive parenting and resting SCL accounting for hostility.