Links between rejection sensitivity and biobehavioral response to laboratory stress in youth☆

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A B S T R A C T

Although rejection sensitivity has been shown to predict altered psychological and relational well-being, a surprising dearth of research has examined physiological effects of this individual difference measure during childhood and adolescence. In the present research, we investigated the relationship between rejection sensitivity, negative affect, and sympathetic nervous system (SNS) response to laboratory performance stressors among youth. Thirty-two normally developing youth completed a modified version of the Trier Social Stress Task. Self-report measures of negative affect and salivary alpha amylase were collected over the course of the stress session. Controlling for gender, rejection sensitivity was related to greater negative affect and blunted alpha amylase reactivity. These data are the first to demonstrate that rejection sensitivity is associated with altered physiological stress response among youth. These findings also identify a plausible psychobiological mechanism that could provide new insight into why rejection sensitivity is a vulnerability factor for suboptimal academic performance in childhood and adolescence.

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1. Introduction

Developing a strong sense of self-worth is one of the key psychosocial projects of youth (e.g., Bowlby, 1969). In an attempt to protect their emerging sense of self, some youth develop rejection sensitivity, a chronic tendency to readily perceive, anxiously expect, and over-react to social rejection (Downey & Feldman, 1996). Although this defensive motivational system helps individuals to quickly identify and avoid new social threats, it can also cause increased negative affect and interpersonal conflict (see Downey, Irwin, Ramsay, & Ayduk, 2004; Romero-Canayas, Downey, Berenson, Ayduk, & Kang, 2010 for reviews).

While the psychological and relational costs of rejection sensitivity have received considerable empirical attention, the potential physiological costs of this perceptual lens have received comparatively less. In situations that require goal-directed behavior (e.g., giving a public speech, completing a timed academic test), a robust sympathetic nervous system (SNS) response (i.e., increased respiration, blood circulation) is required in order to meet the demands of the task. However, when these tasks occur in social conditions where rejection is also possible, it is plausible that rejection sensitive youth might demonstrate altered physiological responses indicative of social threat rather performance challenge (Kassam, Koslov, & Mendes, 2009). In order to address this possibility, the current study examined the degree to which rejection sensitivity modifies emotional and sympathetic nervous system response to laboratory performance stressors in a sample of normally developing youth.

1.1. Rejection sensitivity increases perception of and reaction to subtle social threat cues

As a result of past social rejection, some children and adolescents develop the chronic tendency to readily perceive and anxiously expect cues that signal potential social rejection (Downey, Khouri, & Feldman, 1997; Feldman & Downey, 1994). This cognitive-emotional filter, termed rejection sensitivity, has been associated with greater perceptual attunement to subtle social rejection cues. For example, in a classical conditioning paradigm, emerging adults high in rejection sensitivity showed greater apprehension to an anticipated threat than emerging adults low in rejection sensitivity (Olsson, Carmona, Downey, Bolger, & Ochsner, 2013). Rejection sensitive emerging adults were also more likely to perceive social rejection in new romantic relationships. For example, when asked to imagine what they would think if their romantic partner began to spend less time with them, individuals high in...
rejection sensitivity were more likely to think their partner was rejecting them compared to individuals low in rejection sensitivity (Downey & Feldman, 1996). In other words, individuals with high rejection sensitivity are biased to perceive rejection in otherwise ambiguous social situations.

In addition to detecting a greater frequency of threats in their environment, rejection sensitive individuals also tend to experience more negative affect when they do identify potential threats. For example, in a social rejection paradigm developed by Downey and colleagues, children were asked to complete an interview with a study researcher at their school. In order to make the interview more enjoyable, each child nominated another classmate to join them in the interview room. After the researcher ostensibly asked the nominated classmate to join the child, the researcher informed each child that their classmate did not want them to join them in the interview room. Because they misinterpreted the social cue as a personal rebuff, youth high in rejection sensitivity experienced greater negative affect (i.e., anxiety, depressive symptoms; Downey, Lebolt, Rincón, & Freitas, 1998) and observable distress (Gazelle & Druhen, 2009).

Rejection sensitivity is also theorized to magnify the response of physiological systems designed to detect and respond to social threats (Romero-Canyas et al., 2010), although only one study has examined this proposition. In a study designed to examine the association of rejection sensitivity and magnitude of the startle response (i.e., an automatic eye blink), Downey and colleagues asked emerging adults (aged 18–22) to view artwork that depicted either social rejection or social acceptance themes (Downey, Mougios, Ayduk, London, & Shoda, 2004). While viewing the artwork, participants also heard a loud white noise burst which activated their startle response. Results demonstrate that rejection sensitivity amplified the startle response when participants viewed rejection-themed artwork but not acceptance-themed artwork. In other words, when primed with a social threat, rejection sensitivity hypersensitized the body’s ability to detect threat.

1.2. Rejection sensitivity and sympathetic nervous system activation in response to motivated performance threats

Although rejection sensitivity magnifies negative affect (Downey et al., 1998; Gazelle & Druhen, 2009) and the startle response (Downey, Mougios, et al., 2004) in response to social threat cues, no empirical research has examined the degree to which rejection sensitivity also modifies physiological stress responses. Given that considerable research has shown that social threats reliably activate physiological stress (Dickerson & Kemeny, 2004), research examining the possibility that rejection sensitivity is an individual difference capable of modifying these responses could make an important contribution to this field of research. Moreover, because the majority of existing research has examined the effect of rejection sensitivity in emerging adults (for reviews, see Downey, Irwin, et al., 2004; Romero-Canyas et al., 2010), comparatively less is known about the effects of rejection sensitivity in childhood and adolescence. Social and emotional regulation matures exponentially during this phase of life as do the concomitant neuronal structures and stress responses supporting these skills (Spear, 2013; Steinberg & Morris, 2001). Therefore, understanding whether and to what degree rejection sensitivity modifies negative affect and stress reactivity during this critical phase of development is of considerable importance to researchers and practitioners.

The purpose of the present study, therefore, is to examine the association between rejection sensitivity and SNS reactivity among youth. The modified Trier Social Stress Task for Children (TSST-C; Kirschbaum, Pirke, & Hellhammer, 1993; Kudielka, Hellhammer, & Kirschbaum, 2007) is a laboratory paradigm that reliably elicits stress reactivity in youth. In the modified TSST-C, youth are asked to prepare and give a speech, complete mental arithmetic, and trace a star while a set of two adult judges (i.e., trained research assistants) who maintained neutral nonverbal expressions throughout the procedures (Stroud et al., 2009).

In order to meet the demands of the modified TSST-C, the sympathetic nervous system (SNS)—one of the body’s primary stress management systems—must release catecholamines into the bloodstream (Cannon, 1914). Previous research has demonstrated that alpha-amylase, an enzyme produced by the salivary glands, provides a reliable and non-invasive surrogate marker of SNS activity (Granger, Kivlighan, & el-Sheikh, Gordis, & Stroud, 2007; Nater & Rohleder, 2009). Activation of the SNS serves to increase respiration in order to oxygenate and circulate blood to the brain and peripheral muscles. Because of the increased blood flow, the central and peripheral nervous systems are able to function more effectively, focusing cognitive attention and directing muscular energy towards the environmental demand. As such, a typically-functioning SNS will rapidly and robustly increase reactivity in response to the modified TSST-C in order to mobilize youth to think clearly and act quickly so that they can complete the task effectively.

However, because the speech, arithmetic, and tracing tasks are accompanied by ambiguous social cues, rejection sensitive youth may interpret judges’ neutral facial expressions and bodily postures as indicators of social rejection. Given that youth high in rejection sensitivity tend to misinterpret ambiguous social cues from peers as evidence of social rejection (Downey et al., 1998; Gazelle & Druhen, 2009), it is plausible that they might also experience the TSST-C similarly. That is, because of their proclivity to perceive social rejection in otherwise ambiguous social cues, youth high in rejection sensitivity are likely to perceive the judges’ ambiguous nonverbal cues as evidence of rejection. As a result, youth high in rejection sensitivity are also likely to experience blunted SNS reactivity. Although this hypothesis has not been directly examined, related research provides corroborating evidence. Emerging adults who completed the TSST and were given rejecting, rather than supportive, nonverbal feedback by their judges experienced greater psychological distress but blunted SNS reactivity in the form of reduced cardiovascular efficiency (Kassam et al., 2009). In other words, when emerging adults felt greater social threat than challenge, their bodies were less effective in mobilizing the physiological resources needed to meet the demands of the task.

Therefore, in the present research, we expect that youth exposed to the modified TSST-C who are high in rejection sensitivity will experience greater negative affect than youth low in rejection sensitivity. Moreover, we predict that rejection sensitivity will predict blunted SNS reactivity, as evidenced by lower salivary alpha amylase, a reliable measure of SNS activity (Granger et al., 2007; Stroud et al., 2009).

2. Method

2.1. Participants

Participants for the current study were a subset of 32 healthy youth (16 boys, 16 girls) aged 8 to 17 (M = 12.81, SD = 2.71) who participated as part of a larger study examining sex differences in stress response across puberty (Stroud, Papadonatos, D’Angelo, Brush, & Lloyd-Richardson, 2017). The majority of participants identified their racial/ethnic background as Caucasian (19%; 59.4%) with 25.0% Hispanic, 9.4% Asian, and 6.3% African American. Based on the Hollingshead Index of socioeconomic status (Hollingshead, 1975), 25% of the sample came from high SES households (Hollingshead = 1), 50% were from middle SES households (Hollingshead = 2 or 3), and 25% were from low SES households (Hollingshead score = 4 or 5). Slightly less than half the sample reported being in late puberty (14; 43.8%), as indexed by self-reported Tanner criterion (Marshall & Tanner, 1969, 1970).

Participants were recruited through community and online postings to complete a child behavior study. Interested participants and parents were screened by telephone to determine study eligibility. Exclusion criteria were based on factors known to influence alpha amylase,
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