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The Influence Of Neuroticism On Stress Perception And Its Resultant Negative Affect

Irum Saeed Abbasi
San Jose State University

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THE INFLUENCE OF NEUROTICISM ON STRESS PERCEPTION
AND ITS RESULTANT NEGATIVE AFFECT

A Thesis

Presented to

The Faculty of the Department of Experimental Psychology
San José State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

by

Irum Saeed Abbasi

May 2011

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The Designated Thesis Committee Approves the Thesis Titled
THE INFLUENCE OF NEUROTICISM ON STRESS PERCEPTION AND
ITS RESULTANT NEGATIVE AFFECT

by

Irum Saeed Abbasi

APPROVED FOR THE DEPARTMENT OF PSYCHOLOGY
SAN JOSÉ STATE UNIVERSITY

May 2011

Dr. Greg Feist	Department of Psychology
Dr. Ronald Rogers	Department of Psychology
Dr. Clifton Oyamoto	Department of Psychology

ABSTRACT

THE INFLUENCE OF NEUROTICISM ON STRESS PERCEPTION AND ITS RESULTANT NEGATIVE AFFECT

by Irum Saeed Abbasi

There is contemporary literature reporting the role of the neuroticism (N) personality type in the stress process. People with elevated neuroticism experience more interpersonal stressors, perceive daily events as more negative, and use maladaptive ways to combat stressors. This thesis explores the influence of neuroticism on stress perception and the associated negative affect. In the current study, mood and stress perception of pre-screened college students who scored high and low on the neuroticism subscale were manipulated, with a laboratory psycho-social stressor, after their moods were initially neutralized to their respective base levels. Later, their mood and stress perception were manipulated again through exposure to positive stimuli. The results indicated that the participants in the high neuroticism group had significantly higher base levels of stress and negative affect, as compared to the participants in the low neuroticism group. After the participants were exposed to positive stimuli, the mean stress and negative affect scores of the high neuroticism group were equivalent to its base level mean stress and negative affect scores. However, both groups showed similar increases in their stress perception and negative affect scores during the stress task. Implications and limitations of the study are discussed.

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Introduction

Numerous studies have explored the role of neurotic personality in stressful life experiences and negative emotional outcomes (Bolger & Schilling, 1991; Bolger & Zuckerman, 1995; Gunthert et al., 1999; Penley & Tomaka, 2002). According to Vollrath (2001), the role of personality in the selection, shaping, and creation of general as well as stressful situations is increasingly accentuated in personality psychology. Bolger and Zuckerman (1995) reported that personality is a crucial determinant of health and psychological outcomes. Certain personality traits lower behavioral thresholds, rendering certain behaviors more likely and others less likely. Stress response is one behavior affected by personality. Personality moderates the stress process, starting from the evaluation of the stress experience to the choice of coping strategies, and ultimately to the emotional outcome (Vollrath, 2001). Five broad personality dimensions have been identified as stable personality types: (a) Extraversion (E), (b) Openness to Experience (O), (c) Neuroticism (N), (d) Agreeableness (A), and (e) Conscientiousness (C) (Schneider, 2004). The current study, however, is concerned with neuroticism and, therefore, the discussion will be limited only to this dimension.

Neuroticism

Zobel et al. (2004) defined neuroticism as a temperamental sensitivity to negative stimuli. Neuroticism also refers to a predisposition towards experiencing anxiety, tension, self-pity, hostility, irrational thinking, impulsivity, self-consciousness,

depression, and low self-esteem (Penley & Tomaka, 2002). Ormel and Wohlfarth (1991) asserted that neuroticism accompanies a susceptibility to psychological distress and indicates a proclivity to hold unrealistic ideas, inefficient ways of coping with stress, and an inability to control urges.

Neuroticism consists of two poles of a single dimension: emotional stability and negative emotionality. The term “neuroticism” has also been used interchangeably with the term “negative affectivity” (McCrae, 1990; Ormel & Wohlfarth, 1991; Schwebel & Suls, 1999). People high in negative affectivity appear to be especially sensitive to the minor failures and frustrations of daily life (Zobel et al., 2004). According to Rosenberg (1998), the two widely recognized classes of affective states are moods and emotions. Rosenberg argued that both mood and emotions are transient states that fluctuate throughout the day but that moods last for long periods of time, while emotions are acute, intense, and short lived. According to Watson, Clark, and Tellegan (1988), positive and negative affect are the two strongly negatively correlated dominant dimensions of affect, which have consistently appeared in affect studies. However, Costa and McCrae (1980) reported that due to, earlier research on positive and negative affect, it was concluded that these two dimensions are uncorrelated and independent.

Positive affect (PA) indicates the degree to which a person feels active, enthusiastic, and pleasantly excited. Negative affect (NA) is reflected by an inclination towards experiencing sadness and is a dimension of subjective distress. According to

Hanson, Maas, Meijman, and Godaert (2000), negative affect is defined as “a general dimension of subjective distress and unpleasurable engagement”(p. 317). High NA is characterized by irritability, hostility, nervousness, and shame, whereas low NA is characterized by calmness and serenity (Watson et al., 1988).

Negative Affect and Neuroticism

Neuroticism is defined as an inclination towards experiencing negative affect such that neurotic traits predispose one to suffer more acutely from one’s misfortunes (McCrae, 1990). Mooradian and Olver (1994) reported that neurotic individuals show higher baseline or chronic negative affect. Moreover, Schwebel and Suls (1999) reported that high N individuals have a predisposition toward holding unrealistic ideas and are prone to experiencing anxiety, anger, sadness, and disgust.

Mooradian and Olver (1994) argued that enduring personality attributes forecast transient affective states—in this case, neuroticism predicts negative affect. The relationship between neuroticism and negative affect is explained by the following two views. The temperamental theory claims that neurotics are prone to experiencing negative affect in a given situation. On the other hand, the instrumental view proposes that neurotics may be putting themselves in more disadvantageous situations; consequently, they experience more negative affect (Mooradian & Olver, 1994). Nemanick and Munz (1997) asserted that N could be used interchangeably with negative affect, while extraversion could be used interchangeably with positive affect.

They proposed the possibility that neuroticism and negative affect represent the same underlying construct that accompanies excessive health complaints. Due to similarities between the two constructs, some personality researchers have reportedly employed neuroticism scales to measure negative affectivity (Nemanick & Munz, 1997).

In terms of body physiology, Zellars, Meurs, Perrewé, Kacmar, and Rossi (2009) found a strong correlation between negative affect and muscle tension, such that individuals with high NA showed greater muscle tension following stress and took more time to recover from physiological arousal than did those with low NA. Moreover, Smyth et al. (1998) found an association between negative affect and increased salivary cortisol levels, as well as an association between positive affect and decreased cortisol levels.

Stress

Stress is defined as a burden placed on individuals by external conditions that overwhelm their psychological capacities to adapt (McCrae, 1990). Ormel and Wohlfarth (1991) identified two types of life stresses: exogenous (involving external circumstances) and endogenous (involving internal processes). Transactional stress theory posits that stress is neither rooted in the environment nor in the person, but is a consequence of their ongoing interaction or transaction (Vollrath, 2001). Bolger and Zuckerman (1995) identified two fundamental stages of stress process: stress exposure and stress reactivity. Stress exposure represents the degree to which a person is likely

to experience a stressful event; stress reactivity is the degree to which a person is likely to manifest emotional or physical symptoms in response to a stressor.

The biology of stress. Eysenck's biological theory of personality posits that neuroticism is closely associated with the activity of the autonomic nervous system; consequently, in neurotic individuals stressors lead to more sympathetic arousal than their non-neurotic counterparts (Schwebel & Suls, 1999). According to Dedovic, D'Aguiar, and Pruessner (2009), stress poses a threat to homeostasis, which is followed by a stress response to restore homeostasis. When a person perceives stress, deactivation of the hippocampus takes place, resulting in the disinhibition of the hypothalamic pituitary adrenal (HPA) axis. HPA is the main human stress hormone axis that leads to the release of glucocorticoids (cortisol) in the human body. Excess of cortisol initiates a negative feedback mechanism that curbs further cortisol production (Dedovic, D'Aquiar et al., 2009).

Ormel and Wohlfarth (1991) reported that neuroticism leads to differential psychobiological reactivity to stressors. Zobel et al. (2004) found an association between high neuroticism, depressive temperament, and HPA dysfunction. Although their study included both genders, this association was more apparent among their male participants at and above 25 years of age. Zobel et al. asserted that continuously strong and negative reactions to stress adversely affect the HPA axis and result in its dysfunction. They argued that genetic factors are also crucial and reported twin studies

that confirmed that elevated neuroticism and depression have common underlying genetic factors. Therefore, Zobel et al. concluded that elevated neuroticism and HPA dysregulation moderate as risk factors for affective disorders and also reflect a predisposition towards coping less effectively with stress and its related challenges.

Psychological stress is investigated in laboratories to measure people's unique reactions to stressful experiences. Researchers have used different methods to induce stress in controlled settings; these methods include public speaking, recalling previous stressful experiences, and watching stressful films (Kirschbaum, Pirke, & Hellhammer, 1993; Lazarus, 1993). According to Nejtek (2002), psychological stressors such as public speaking, medical exams, parachute jumping, and watching suspenseful films such as "The Shining" and "Psycho" significantly increase people's salivary cortisol levels above their "at-rest" baseline levels. Dedovic, Wadiwalla, Engert, and Pruessner (2009) studied gender differences in response to laboratory psychosocial stressors and found that different types of laboratory stressors produced different reactions in men and women. For example, challenging mathematical tasks given under time pressure significantly increased cortisol levels in men, as compared to women. Similarly, social rejection stress tasks significantly increased cortisol levels in women when compared to men (Dedovic, Wadiwalla et al., 2009).

Stress appraisal and coping. Lazarus and other researchers have identified two crucial processes that act as mediators of stressful person-environment relations and

their immediate and long-range outcomes (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). These two processes are cognitive appraisal and coping. According to Lazarus (1993), appraisal is deemed as a universal process in which people continuously evaluate the importance of what is happening for their personal well-being. Lazarus defined appraisal as “cognitive mediator of stress reactions” (p. 7). Cognitive appraisal has two parts: primary appraisal and secondary appraisal. In primary appraisal, a person makes an assessment to ascertain whether he or she has anything at stake in the stress encounter. In secondary appraisal, a person makes an evaluation as to whether he or she can do anything to overcome the harm or improve the chances of benefiting from the stressful situation (Folkman et al., 1986; Lazarus, 1993).

Coping is another critical process that follows appraisal and consists of cognitive and behavioral efforts to prevent, manage, and relieve stress (Penley & Tomaka, 2002). Coping is defined as “the person’s constantly changing cognitive and behavioral efforts to manage specific external and/ or internal demands that are appraised as taxing or exceeding the person’s resources” (Folkman et al., 1986, p. 993).

Previous research on coping suggests that coping carries out two primary functions. First, it regulates stressful emotions by attempting to change what is attended to and how it is appraised (emotion-focused coping); and second, it changes the distress-causing person-environment relation by attempting to change person-environment realities behind negative emotions (problem-focused coping) (Folkman et

al., 1986; Lazarus, 1993). Coping is tied to appraisal such that if appraisal of a stressful situation indicates that something can be done to change the situation, then problem focused coping ensues; however, if appraisal indicates that nothing can be done to change the situation, then emotion focused coping predominates (Lazarus, 1993)

Lazarus (1993) deemed coping to be highly contextual, and reported that the effectiveness of coping depends on its ability to change over time and across different stressful situations. Lazarus asserted that coping serves as a powerful mediator of emotional outcomes; for instance, positive and negative outcomes are each associated with particular coping strategies. Moreover, coping not only shapes psychological stress, but also shapes emotions by influencing the person-environment relationship and its appraisal. Different coping patterns are employed based on the type of stressful encounter, the type of personality involved, and the outcome modality (Lazarus, 1993).

Personality, appraisal, and coping. According to Cohen, Kamarck, and Mermelstein (1983), health researchers commonly assume that the impact of objectively stressful events is determined by one's perception of an event's stressfulness. Bolger and Zuckerman (1995) argued that personality influences the stressor reactivity by mapping out coping choices, their likely effectiveness, or both. Vollrath (2001) asserted that personality outlines the stress-reaction process that begins at the stress appraisal, then proceeds to the choice of coping techniques, and eventually leads to the emotional outcome.

Neurotic individuals appraise stressors as more aversive than do less-neurotic individuals and are prone to making negative appraisals of self, others, and their experiences (Gunthert et al., 1999; Schwebel & Suls, 1999). Vollrath (2001) argued that highly neurotic and anxious individuals describe even common everyday situations as threatening and report elevated levels of daily hassles. According to Schneider (2004), heightened threatening stress appraisals are believed to delay physiological affective recovery following stressors.

Neuroticism is associated with feelings of ineffective coping ability (Schneider, 2004). According to Gunthert et al. (1999), coping effectiveness is correlated with the degree to which the coping strategies are effective in relieving distress. Vollrath (2001) argued that wishful thinking and self-blame are special coping characteristics of people high in neuroticism. Past research showed that in response to major life events, elevated N is associated with maladaptive emotion-focused coping such as escapist fantasy, hostile reactions, wishful thinking, distancing, sedation, self-blame, withdrawal, and emotional venting (Penley & Tomaka, 2002).

In a consecutive 14-day diary study, Gunthert et al. (1999) examined the influence of N on appraisal, coping, and mood at the end of each day. Their participants were pre-screened to obtain a sample that included people high and low in neuroticism. During the study, first the participants described their most stressful event of the day. Second, they provided appraisals of their overall stressfulness, controllability,

undesirability, resolution, and coping efficacy. Finally, the participants identified their coping strategies and their end-of-day mood. Gunthert et al. found that interpersonal stressors were directly related to increase in distress among all participants. However, this increase was found to be higher among high N participants than among the low N participants. Moreover, high N was associated with negative self-evaluation bias. Stress appraisal determined emotional reactivity; in other words, negative affect was positively correlated with primary appraisal of stressfulness and negatively correlated with secondary appraisal of coping efficacy. Gunthert et al. concluded that severe emotional reactivity to negative appraisal might be a reason why high neuroticism is associated with sustained negative mood on a daily basis.

In a study using a laboratory speech stressor, Penley and Tomaka (2002) examined the influence of the Big Five personality types on stress and coping processes. Their sample included undergraduate students who had completed a personality measure before preparing a speech on a previously chosen topic. Before the speech performance, the participants answered a stress appraisal questionnaire. Immediately after the three-minute speech performance, the participants reported their emotional reactions and any coping strategies they had employed during the stress task. Two coders also independently rated the participants' speech performance. Penley and Tomaka found that participants high in N reported low perceived coping ability and high total negative emotions, especially emotions such as anxiety, fear, and self disgust. Neuroticism was positively correlated with emotion-focused coping and inversely

related to speech performance, thus indicating low self-esteem. Moreover, neuroticism negatively predicted problem-focused coping such as planning (Penley & Tomaka, 2002).

Neuroticism, Stress, and Negative Health Outcomes

Schneider (2004) found an association between neuroticism and negative health outcomes based on the findings that neuroticism intensifies stress reactivity, which in turn leads to greater stress vulnerability. Zobel et al. (2004) reported studies that suggest a correlation between neuroticism and first-time manifestation of unipolar depression. Moreover, Bolger and Zuckerman (1995) put forth a “differential exposure-reactivity model for anger and depression” (p. 899), arguing that high N individuals experience more daily conflicts, which make them more susceptible to react with anger and depression. Bolger and Schilling (1991) proposed three ways in which personality can influence health and psychological well-being. First, they argued that personality could help explain why some people encounter more stressful situations than others; second, personality may determine how people will react when faced with a stressful situation; and third, personality may have a direct effect on a person’s well-being.

Another pathway to disease via stress is through hippocampal damage, which is linked with chronically elevated cortisol levels. The hippocampus is involved in cognitive functioning, especially memory consolidation (Jelicic et al., 2002). This finding led to studies on older adults, in an effort to ascertain whether elevated neuroticism leads to cognitive impairment in later life, since highly neurotic individuals experience more

prolonged stress (Jelicic et al., 2002; Jorm, Mackinnon, Christensen, & Henderson, 1993). Jorm et al. (1993) showed a relationship between neuroticism and poorer cognitive performance in older adults with dementia; however, Jelicic et al. (2002) found no such relationship. Nevertheless, Jelicic et al. supported the idea that neurodegenerative processes in later life cause an increase in neuroticism among demented patients.

Present Study and Hypotheses

To summarize, numerous studies have investigated whether people with elevated neuroticism are prone to experiencing more stress in their daily lives or have an equal chance of experiencing stress as do their low neuroticism counterparts. Such studies included diary reports, job satisfaction surveys, and laboratory stress interventions (Bolger, 1990; Bolger & Zuckerman, 1995; Gunthert et al., 1999). These and other researchers found that, under stressful conditions, neuroticism was a predictor of increased anxiety and other negative affects (McCrae, 1990). Previous research has also established that highly neurotic individuals appraise stressors as more aversive and cope with them using emotion-focused coping.

Therefore, the hypotheses explored in the present study were that in response to stressful conditions, individuals high in N will react with higher stress perception and higher negative affect than individuals low in N. Moreover, when compared with

individuals low in N, individuals high in N will ignore the positive stimuli in the environment and will show resistance to mood change.

Method

Participants

Potential participants for this experiment were pre-screened to obtain a sample with extreme scores on the neuroticism subscale of the Big Five Inventory (BFI). Two hundred and thirty-six San José State University (SJSU) Introductory-Psychology students took a survey comprised of both demographic questions and 15 items from the BFI that included all eight neuroticism subscale items. One hundred and eighty-five surveys were collected online and 51 were collected in class. However, only 164 surveys were analyzed and 72 of those were discarded because of incomplete submission of the surveys or meeting the exclusionary criteria of self-reported anxiety, post-traumatic stress disorder, or other similar disorders.

Of the total 15 BFI items included in the survey, only eight neuroticism subscale items were analyzed, along with the demographic questionnaire. Power analysis was done using G power (3.1; Faul, Erdfelder, Buchner, & Lang, 2009) to estimate the total sample size with a power of 0.80 and medium effect size of 0.25. The total estimated sample size was 28; however, 36 participants were included in the study: 18 high in N and 18 low in N. Data from two participants were excluded because, according to them, they suspected the purpose of the study and were non-serious in answering the scales. The high and low N participants were the top and bottom quartiles of our sample of 164

participants. The low N group was comprised of participants who scored 18 and lower on the recoded N subscale; the high N group was comprised of participants scoring 28 or higher out of the possible maximum score of 40. Our sample included 22 females and 12 males, ranging in age from 18 to 30 ($M = 19.5$, $SD = 2.42$). However, most of our sample participants were between the ages of 18 to 20 (91%). Almost all of our participants were given one hour of course credit in return for their participation, while the rest were given a \$15 incentive to participate.

Measures

The Big Five Inventory (BFI). The Big Five Inventory was administered in order to identify persons who were high versus low in neuroticism. The BFI was developed by John, Donahue, and Kentle in 1991 and contains 44 short and easily understandable items that take five minutes to complete (John, Naumann, & Soto, 2008). The BFI uses short phrases established on attribute objectives known to be classic markers of the Big Five personality dimensions: Extraversion, Neuroticism, Openness to Experience, Conscientiousness, and Agreeableness. According to the developers, BFI yields good reliability with alpha scores ranging from 0.75 to 0.80 in U.S. and Canadian samples (John et al., 2008).

The BFI contains eight neuroticism items, but the small number of items does not compromise “content coverage or psychometric properties” (John et al., 2008, p. 130). The mean internal consistency of BFI neuroticism subscale is higher (0.87) than

the mean internal consistency of all the subscales within BFI (0.83) (John et al., 2008). Moreover, John et al. reported validity correlations of .52 for the N subscale. Some items of the neuroticism scale include, "I see myself as someone who is: depressed, blue, can be tense, worries a lot." The response format is based on a 5-point scale (1= *disagree strongly* and 5 = *agree strongly*).

Mood scale (PANAS). The Positive Affect and Negative Affect Scale (PANAS) developed by Watson et al. (1988) was used to assess momentary affect before, during, and after the stress task. The negative affect scale consists of 10 adjectives items with a negative connotation, such as, afraid, ashamed, distressed, guilty, nervous, and the like. The positive affect scale also consists of 10 items, but with a positive connotation, which include adjectives such as alert, attentive, determined, enthusiastic, inspired, strong, and the like. We added an additional adjective, stressed, to the 20 affect items of the PANAS scale. This addition was merely done as a manipulation check and was not included while scoring PANAS.

Watson et al. (1988) reported that both positive and negative affect scales are internally consistent, which gives PANAS high internal consistency reliability values (coefficient alpha = 0.84-0.90). Watson et al. also reported that the reliability of the scales is unaffected by differing time instructions, such as, right now, today, past few weeks, or in general. For this study, we were interested only in the momentary affect, whose reliability coefficient is 0.89 for PA and 0.85 for NA (Watson et al., 1988). When

used with short-term instructions (right now, today), PANAS is sensitive to fluctuations in mood (Watson et al., 1988). In our study, the participants rated the degree to which they experienced each of the 20 mood adjectives, at that moment, on a 5-point scale (1 = *Not at All* and 5 = *Extremely*).

International Affective Picture System (IAPS). In this study, 12 neutral and 12 positive pictures from the International Affective Picture System (IAPS) were shown for eight seconds each. The IAPS is the most widely employed instrument in a laboratory setting to manipulate mood and affect (Mendonca-De-Souza et al., 2007). It consists of a standardized set of emotion evoking colored photographs that vary in valence and arousal. Lang (1995) considered pictures as convenient laboratory stimuli that allow “controlled exposure, in timing and intensity, and exact reproduction within and between experiments and laboratories” (p. 374). Lang reported split-half coefficients for valence and arousal of 0.93 and 0.94, respectively, and presented evidence that the IAPS is largely culture free and can be rapidly administered. Pleasant pictures include scenes of families, puppies, sports, and romance; neutral pictures include scenes of household objects and neutral faces. In prior mood studies, researchers reported that in healthy individuals, negative affect diminishes after exposure to positive pictures (Lang, 1995).

Perceived Stress Scale (PSS). According to Cohen and Williamson (1988), the Perceived Stress Scale (PSS) measures the perceived degree to which environmental

demands exceed a person's ability to cope. PSS is a brief scale that measures the degree to which situations in one's life are assessed as stressful (Cohen & Williamson, 1988; Cohen et al., 1983). Items in the PSS deal with the estimation of how uncontrollable, unpredictable, and overloaded respondents find their lives to be. It also includes some items that directly tap into current levels of experienced stress. PSS has adequate internal and test-retest reliability and shows a correlation between a range of self-report and behavioral criteria. Cohen and Williamson reported a cross-sectional study where higher PSS scores were linked with increased disposition to stressful life-event-elicited depressive symptoms. Use of the PSS scale is deemed appropriate in studies that investigate factors influencing and influenced by stress appraisal (Cohen & Williamson, 1988).

The original PSS scale included 14 items, yet further research narrowed it down to 10 items (Cohen & Williamson, 1988). In this study, the 10-item PSS was used that reportedly has good internal reliability with Cronbach's alpha equaling 0.78 (Cohen & Williamson, 1988). The original PSS asks for stress perception in the past month; however, for this study current stress perception was rated using a different response format covering a short period on a 4-point scale (*0 = not at all and 4 = completely*). According to Cohen et al. (1983), items in a subjective scale like the PSS should be able to tap into questions covering shorter time periods. The PSS can be used as an outcome variable measuring the respondent's level of experienced stress as a function of objective stressful events, coping resources, and personality factors (Cohen et al., 1983).

Trier Social Stress Test (TSST). This study employed a modified version of a widely administered stressor, developed by Kirschbaum et al. (1993) at the University of Trier in Germany, called the Trier Social Stress Test (TSST). The TSST is a method of inducing mild to moderate psychosocial stress in human volunteers (Childs, Vicini, & De Wit, 2006). It consists of an anticipation period, followed by a free speech and mental arithmetic performance in the presence of an audience (Kirschbaum et al., 1993). In healthy adults, the TSST produces moderate increases in cortisol levels, heart rate, blood pressure, and increases in subjective reports of anxiety (Childs et al., 2006).

Smyth et al. (1998) found that the cortisol levels increased not only with acute stressors but also with anticipation of stressors in the near future. For example, they reported increases in cortisol levels before academic examinations, dental extractions, cardiac surgery, and exhaustive exercise. Therefore, to induce stress perception in this study, we only used the partial TSST that included anticipation of giving a speech and doing mental arithmetic, without having the participants actually perform. Since this method of inducing stress is not established as a reliable method of inducing stress, we added manipulation checks to track its effectiveness.

To induce stress, the TSST utilizes a social evaluative threat produced by being observed by trained judges while being videotaped. Kirschbaum et al. (1993) found that increases in threat cause an increase in the physiological reaction to the stress task. Childs et al. (2006) reported even more increases in the physiological responses to the

TSST when participants were added to the audience of judges. Participants in our study did not perform the actual speech and arithmetic part of the TSST, as participants did in the Childs et al. study; however, we partially followed their procedure and increased the social evaluative threat by adding the participants to the audience of judges. To increase the threat even more, a female confederate was introduced as a participant who actually performed the speech and arithmetic part.

Procedure

For this study, we employed a 2x3 mixed quasi-experimental design. The between-groups condition was high and low neuroticism and the within-groups conditions were repeated measures (before, during, and after the stress task). The dependent variables were the perceived stress scores on the PSS and the negative affect scores on the NA subscale of the PANAS.

This study was conducted in groups ranging in size from three to 10 participants in each session. Upon arrival, participants agreed to the terms of the study and signed the consent forms. The study started with verbal instructions that outlined the course of the study. In the beginning, participants viewed 12 neutral pictures that were shown for eight seconds each. After viewing the pictures, participants completed mood (PANAS) and perceived stress (PSS) inventories that focused on their momentary feelings.

After the completed inventories were collected, pre-recorded audio instructions were played while two confederates, who would act as judges, entered the room with a video camera, audio recorder, and notepads. The audio instructed the participants to prepare a convincing three-minute speech about their dream job, which they would present in front of two judges and other participants. The participants were led to believe that the judges were qualified speech analysts, who would give them feedback at the end of each speech. They were also told that a video camera and an audio recorder would record their performance so that the judges could effectively analyze their speeches. Following these instructions, the judges left the room and the primary researcher told the participants that they had five minutes to prepare their speeches, while she handed them blank sheets and pencils.

On completion of the five-minute preparation time, the judges reentered the room and sat down. One judge then selected a confederate, seated in the middle of other participants, to perform her speech and mental arithmetic part. The video camera and audio recorder were switched to the recording mode and focused on the mock confederate. A wristwatch was used to calculate time and to signal the beginning and end of the allowed speech and mental arithmetic time. The confederate gave a pre-scripted speech (see Appendix E) and acted like she was stressed and nervous by adding lots of pauses and by avoiding eye contact. All confederates had practiced their part extensively and the primary researcher subjectively approved of their acting prior to the study. During the confederate's performance, the judges scribbled on their notepads,

pretending to take notes. After the speech was completed, one judge read the pre-scripted feedback, for example, “You were not confident while speaking and had a lot of amms.”

After the confederate was informed that she had performed poorly, she was asked to mentally subtract the number 13 from 1022, speaking the result aloud each time, and to continue serial subtracting aloud for one minute. The mock confederate again made the pre-scripted mistakes. After every mistake, she was asked by one judge to start over, again subtracting 13 from 1022. On the completion of one minute, the mock confederate was stopped and the second judge gave her pre-scripted feedback, suggesting that her performance was very poor. (Pre-scripted feedback is important because it potentially reduces variability that might arise when changes in the wording of the feedback are made in various sessions.)

After the performance of the confederate had finished, the judges told the researcher that they would need some time to finalize their comments related to the last speech, before continuing to the next speech. The primary researcher told the judges to take their time and informed the participants that while the judges were busy discussing the last speech, she would administer the two inventories again.

After the second completed inventories were collected from the participants, one judge checked the video camera and said the following pre-scripted words loudly, “The previous speech was not recorded and looks like the tape is stuck.” The primary

researcher pretended to fix the video camera, but upon failure to do so asked the judges to continue without the video camera. The judges excused themselves from analyzing the performance without recorded speeches. They then took their apparatus and left.

Upon dismissal of the judges, the researcher announced that the speech and mental arithmetic part would need to be cancelled, due to technical problems. The participants were then told that, as a final step, they would be asked to view the next set of pictures. After the participants had viewed 12 positive pictures, mood and stress perception inventories were administered for the final time. The positive pictures were intended to elevate the participants' mood and to diminish the negative affect induced by stress. According to Mendonca-De-Souza et al. (2007), stress-produced negative affect diminishes after exposure to pleasant pictures in healthy subjects.

After the completed inventories were collected, participants were debriefed and given information about the campus-counseling center. Before their dismissal, they were also asked about their feelings during the study and whether their mood and stress level had fluctuated during the study. They were explicitly asked if the anticipation of giving a speech and performing the arithmetic task was successful in inducing stress. Moreover, they were asked if the performance of the mock confederate had elevated their stress level beyond what they felt before her

performance. These questions were asked to verbally confirm the stress manipulation check.

Results

Planned Tests

The data were analyzed using the 2x3 mixed design general linear model (GLM) repeated measures and independent sample t-tests (with a pre-determined alpha value of .05). The hypotheses were tested to see whether participants high in N react with higher stress perception and higher negative affect to stress experiences and whether they show resistance to mood change, when compared to participants low in N.

The perceived stress mean scores of the high N group on PSS before, during, and after the stress task were 18.59 (SD = 6.57), 23.59 (SD = 5.69), and 17.94 (SD = 5.70), respectively, versus the low N group mean scores of 13.12 (SD = 4.85), 21.12 (SD = 8.66), and 14.18 (SD = 6.39), respectively. The high N group had higher mean stress scores than did the low N group in all three conditions; however, only the difference in the mean stress scores before the stress task (i.e., after the neutral pictures) was significant, $t(32) = 2.76, p = .009$. Moreover, GLM tests of between-subjects effects also revealed a main effect for neuroticism, $F(1, 32) = 4.63, p = .039, \eta_p^2 = .126$, suggesting that on average across the conditions there is a significant difference between low and high neurotics (see Figure 1).

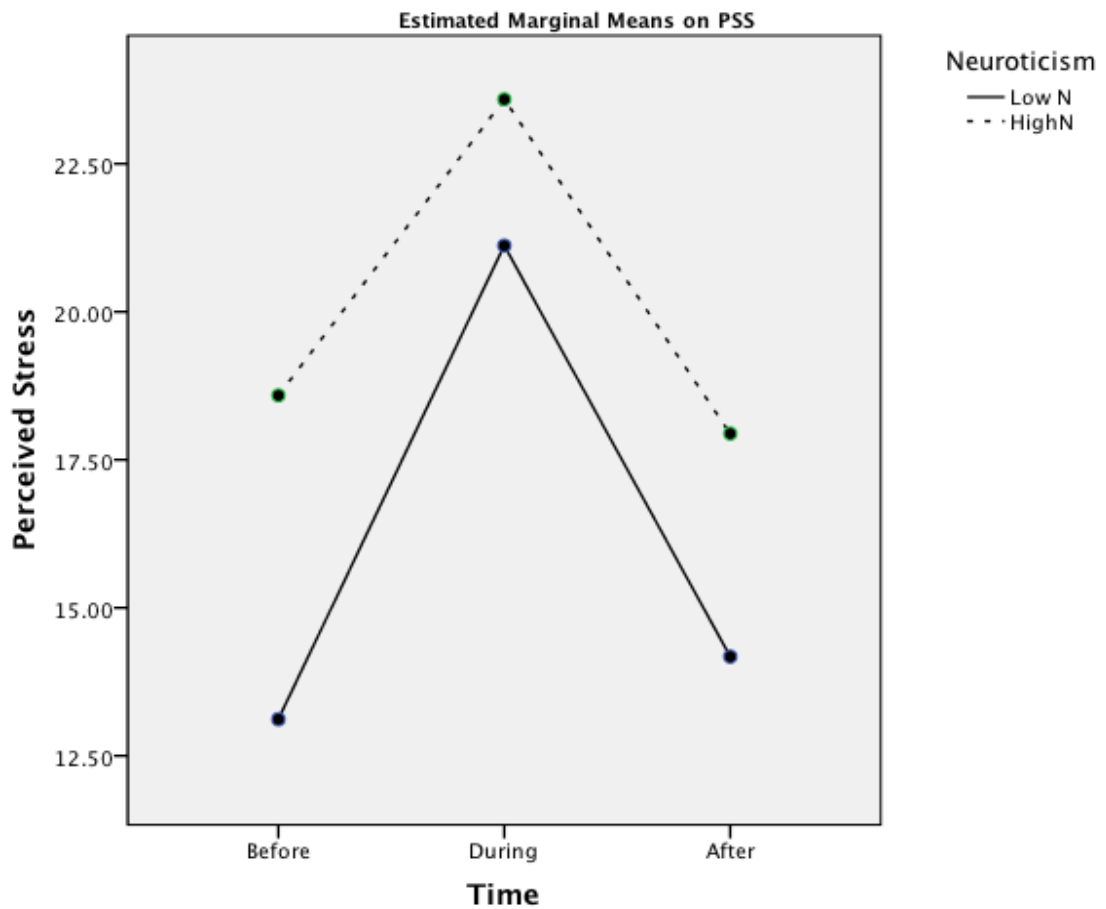


Figure 1. Perceived stress scores of participants high and low in N, before, during, and after the stress task.

Similarly, GLM tests of within-subjects effects showed a main effect for time ($F(2, 64) = 23.36, p < .001, \eta_p^2 = .42$), as the perceived stress mean scores differed significantly between at least two of the time points. There was no interaction between neuroticism and time for stress scores, $F(2, 64) = .97, p = .385, \eta_p^2 = .03$, suggesting that the two groups did not react differently across time in the study.

The mean negative affect scores of the high N group on PANAS before, during, and after the stress task were 16.59 (SD = 6.25), 27.35 (SD = 7.87), and 16.29 (SD = 4.71), respectively, versus the low N group scores of 12.71 (SD = 2.97), 24.94 (SD = 10.46), and 15.00 (SD = 7.13), respectively. The high N group had higher mean NA scores than did the low N group in all three conditions; however, only the difference in the mean NA scores before the stress task (i.e., after the neutral pictures) was significant, $t(23) = 2.31$, $p = .03$ (see Figure 2).

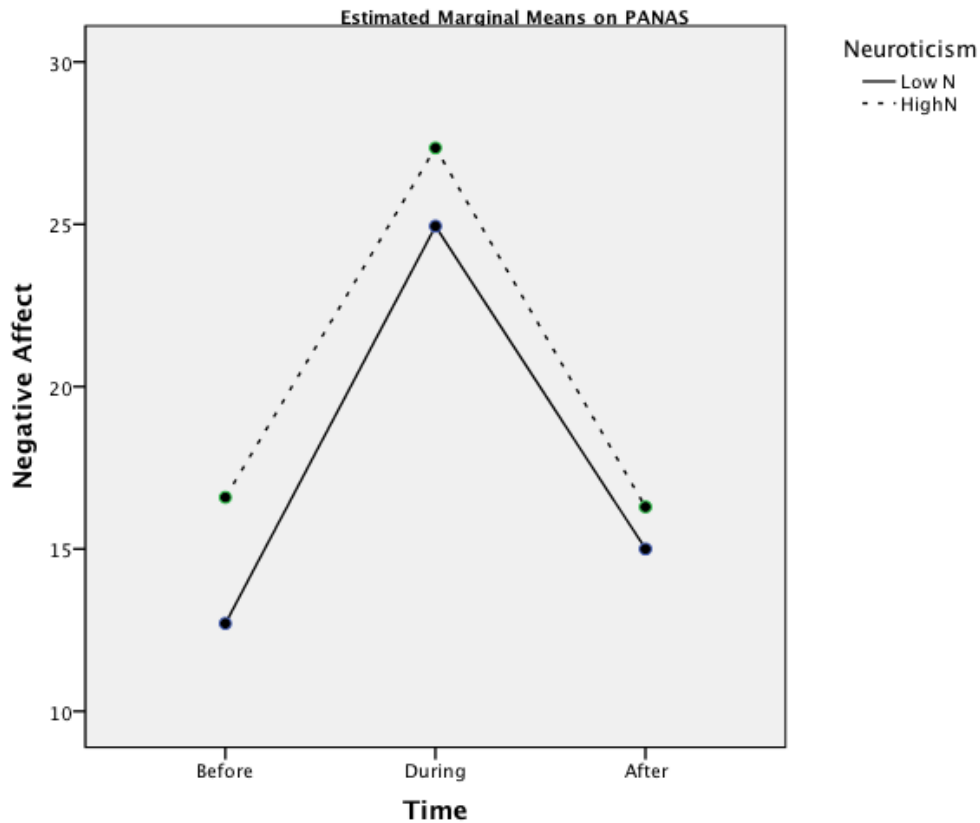


Figure 2. Negative affect scores of participants high and low in N, before, during, and after the stress task.

For negative affect mean scores, GLM tests of between subjects effects showed no main effect for neuroticism, $F(1,32) = 2.02, p = .165, \eta_p^2 = .06$. Moreover, GLM tests of within-subjects effects revealed a main effect for time, ($F(2, 64) = 42.35, p < .001, \eta_p^2 = .57$), suggesting that the negative affect mean scores differed significantly between at least two of the time points. However, there was no significant interaction between neuroticism and time for NA scores, $F(2, 64) = .44, p = .646, \eta_p^2 = .01$, thus indicating that the two groups did not react differently across time.

Exploratory Analyses

Post hoc tests were performed to test the non-predicted results. For example, we tested whether gender played a role in the reaction towards stressful experiences. For the analyses, a 2x3 (male/female X time) mixed design GLM repeated measure and the independent sample t-tests were used.

The perceived stress mean scores of females on PSS before, during, and after the stress task were 16.41 (SD = 1.36), 24.36 (SD = 1.47), and 17.60 (SD = 1.28), respectively, versus the male scores of 14.83 (SD = 1.84), 18.67 (SD = 1.99), and 13.25 (SD = 1.73), respectively. Females had higher stress scores than did males in all three conditions; however, only the differences in the stress scores during the stress task ($t(32) = 2.30, p = .03$) and after the stress task (i.e., after the positive pictures) ($t(32) = 2.02, p = .05$) were significant. (see Figure 3).

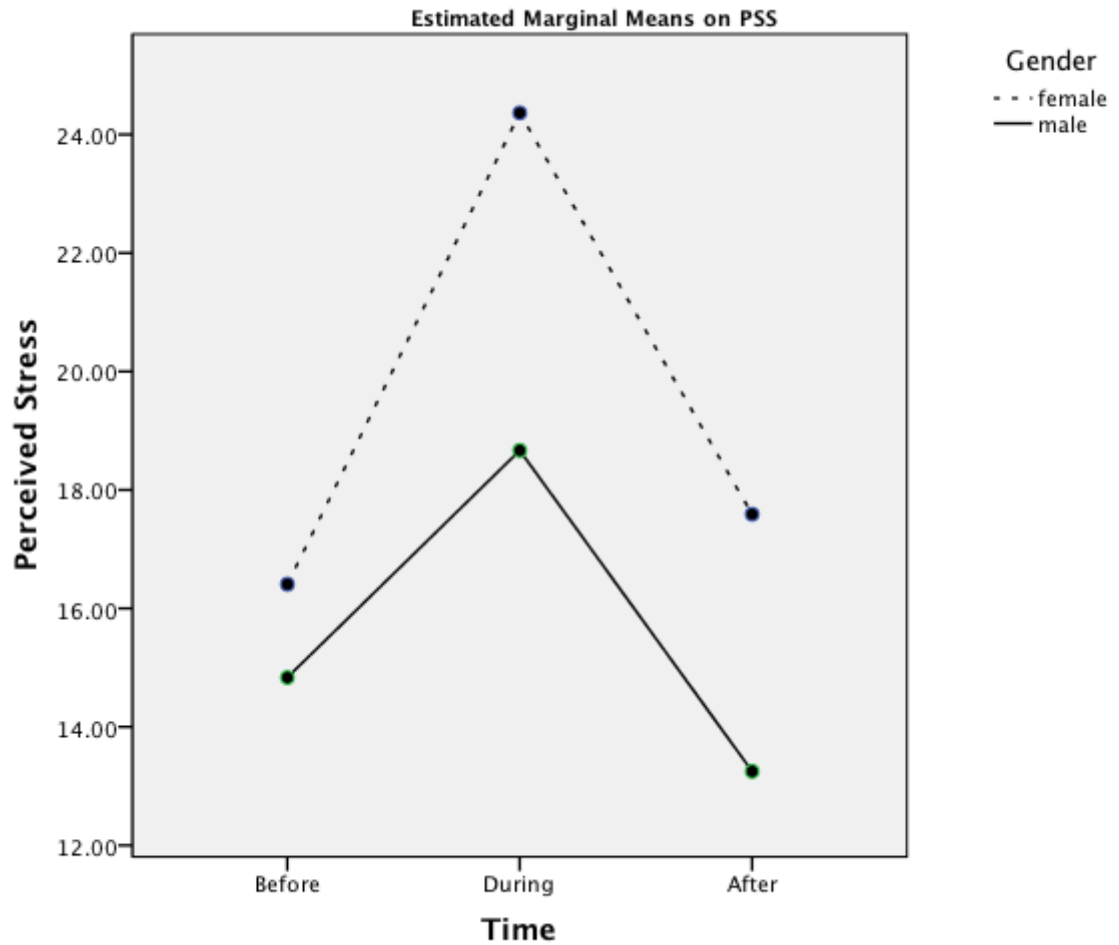


Figure 3. Perceived stress scores of males and females, before, during, and after the stress task.

GLM tests of between-subjects effects showed a main effect for gender, $F(1, 32) = 4.10, p = .05, \eta_p^2 = .11$. Nevertheless, there was no significant gender by time interaction for stress scores, $F(2, 64) = 1.77, p = .18, \eta_p^2 = .05$.

The negative affect mean scores of females on PANAS before, during, and after the stress task were 15.14 (SD = 5.95), 28.59 (SD = 8.38), and 16.14 (SD = 6.24), respectively, versus the male scores of 13.75 (SD = 3.52), 21.67 (SD = 9.21), and 14.75 (SD = 5.66), respectively (see Figure 4).

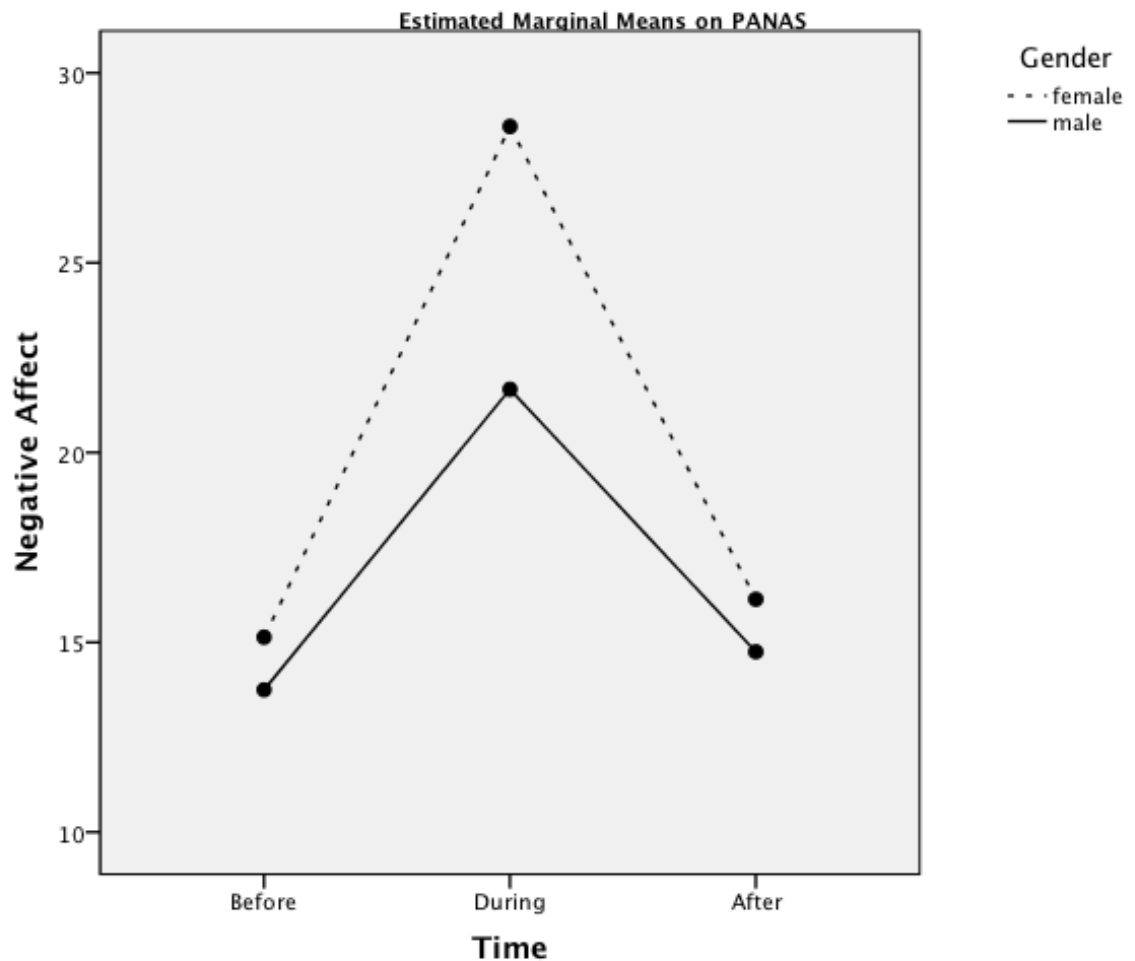


Figure 4. Negative affect scores of males and females, before, during, and after the stress task.

Females showed higher negative affect than males, but this difference was only significant during the stress task, $t(32) = 2.22, p = .03$. Therefore, there was no main effect for gender, $F(1, 32) = 3.11, p = .08, \eta_p^2 = .09$. Moreover, for negative affect, there was no statistically significant interaction seen between time and gender, $F(2, 64) = 2.60, p = .08, \eta_p^2 = .07$.

Discussion

The present study focused on identifying differences in the stress reaction process based on a particular personality type (neuroticism) that is thought to predispose individuals to stress and its related illnesses. The hypotheses explored in the study were based on differences in the stress reaction process among the high and low neuroticism group. We wanted to see, first, whether the two groups would react to stress differently with dissimilar increases in their stress perception and negative affect scores after stress exposure; and second, once stressed, whether the two groups would react to positive stimuli differently with resistance to mood change shown by the high N group.

Summary of the Results

We found mean differences in the stress scores of the high and low N group after the neutral pictures and before the stress task, suggesting that even before the two groups were exposed to the stress task, high N group had higher stress levels. With respect to negative affect after neutral pictures and before the stress task, a similar trend was seen; high N group had higher negative affect mean scores than did the low N group.

These results support previous research that reported that neuroticism predisposes individuals to experiencing negative affect and that people with elevated N are reported to have a higher base level of negative affect even in the absence of

stressful situations (Costa & McCrae, 1980; Vollrath, 2001). Mooradian and Olver (1994) also reported that high N individuals experience chronic negative affect. Contrary to Vollrath's (2001) report that individuals high in N perceive and appraise the same event as more demanding and threatening than do those who are low in N, we found minimal differences between the mean stress and negative affect scores of the two groups, during the stress task. Both groups appraised stress alike, with similar increases in their stress scores, and coped with stress with comparable increases in their negative affect levels. Since we did not find a statistically significant difference in the magnitude of stress increase during the stress task between the two groups, we conclude that in the present study both groups reacted similarly in appraising the stress task. Gunthert et al. (1999) found that the magnitude of distress increases in most individuals with an increase in stress perception and that among individuals who are high in neuroticism, such increases in distress are also accompanied with greater increases in negative affect than among individuals low in N. In contrast to Gunthert et al., we found that due to perceiving and appraising stress similarly, the high N group did not react to stress with greater increases in NA.

Contrary to our last hypothesis, we found that both groups reacted similarly to the positive stimuli, with a decline in their perceived stress and negative affect mean scores that were comparable to their respective base level stress and negative affect scores recorded after neutral pictures. This confirmed the Mendonca-De-Souza et al. (2007) finding that stress-produced negative affect diminishes after exposure to

pleasant pictures in healthy subjects. It is important to note that Mendonca-De-Souza et al. did not explore the role of neuroticism in their study, which was the focus of the present study. Therefore, we report that in a neuroticism paradigm, the positive pictures are a reliable source of restoring the stress-induced negative affect back to one's respective base-level negative affect. We also found a difference between the positive affect mean scores of high N ($M = 21.35$, $SD = 7.15$) versus low N ($M = 26.53$, $SD = 8.22$) group after exposure to the positive pictures.

Our post hoc finding of women showing more pronounced reaction to stress, than men, is an important one. Contrary to the Dedovic et al. (2009) report that men show a higher stress response than women when exposed to a laboratory psychosocial stressor, we found that females had significantly higher perceived stress and negative affect scores during the stress intervention. Following the positive stimuli, both genders showed reduction in their negative affect that was comparable to their base level negative affect. However, in contrast to men, women showed significantly higher stress scores even after they were exposed to the positive stimuli. This may suggest that women tend to hold on to their stressors for longer than men. Dedovic et al. reported that social rejection stressors in women elicit significantly higher cortisol increase than men. Correspondingly, one possible explanation for the reason of women in our study showing more intense reaction to the stress task may be rooted in the fact that, in our study, we consistently used the same female mock confederate. Due to this confound, when performance of the mock confederate was rejected by the judges, other women

readily identified with her, making them vulnerable to experience more stress than men.

Implications

Stressful life events are associated with neurotic impairment, depression, and proneness to infectious diseases (Smyth et al., 1998). If elevated N and stressful experiences predispose individuals to various kinds of illnesses, then the results from our study imply that individuals high in N may not be at health risk due to their pronounced reactions to stressful life experiences, but rather due to being in a chronic higher base level of perceived stress and negative affect, than individuals low in N. To our knowledge, this is the first study to date that used partial TSST with a special manipulation to induce stress, that is, anticipation of giving a speech and doing mental arithmetic, along with the stress of viewing a poor performance of the confederate and the harsh feedback she received. Both manipulation checks (written and oral) confirmed that this laboratory stressor was successful in inducing stress.

Limitations

The inferences from this study are limited in some ways. First, the results from this study can only be generalized to a college-going young population, since most (91%) of our study sample was between the ages of 18 to 20 years. Second, though the partial TSST successfully produced stress, we did not measure the cortisol levels after stress manipulation. Therefore, it is possible that the stressor could have caused varied levels

of stress in each participant. According to Hanson et al. (2000), daily stressors, smoking, and lunch consumption are all associated with increases in cortisol levels. Moreover, sleep is linked with elevated cortisol levels if it is insufficient the night before (Hanson et al.). Since, we did not track the amount of sleep, smoking, and food before the study, therefore, when participants in our study were asked about their momentary life stress, their responses could also have been different based on their last night sleep, smoking, food intake, and other factors.

Moreover, this study was conducted in sessions consisting of dissimilar numbers of participants in each session, which may have confounded our results. Another possible confound could have been dissimilar compensation offered for participation. Future studies can avoid some of the limitations of this study, for example, by repeating this study with a similar number of males and females in each group, with a similar compensation incentive, and with an increased sample size. Finally, future studies can also limit the amount of food intake before the experiment, and either exclude smoking as a blocked variable or add it as a covariate.

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Appendix A

Demographic Questionnaire

1) What is your gender?

2) What is your ethnicity?

3) What is your education level?

4) Have you ever been diagnosed with any of the following? YES NO

A. Post Traumatic Stress Disorder (PTSD)

B. Depression

C. Anxiety disorder

D. Panic attacks

E. Affective disorder

Appendix B

(Partial) Big Five Inventory (BFI)

I SEE MYSELF AS SOMEONE WHO...

(Choose from one of the following to answer the following questions)

1) *Disagree strongly* 2) *Disagree a little* 3) *Neither agree nor disagree*

4) *Agree a little* 5) *Agree strongly*

A) Does a thorough job 1 2 3 4 5

B) Tends to find fault with others 1 2 3 4 5

C) Is reserved 1 2 3 4 5

D) Is depressed and blue 1 2 3 4 5

E) Is relaxed, handles stress well 1 2 3 4 5

F) Is curious about many different things 1 2 3 4 5

G) Can be tense 1 2 3 4 5

H) Has a forgiving nature 1 2 3 4 5

I) Worries a lot 1 2 3 4 5

J) Is generally trusting 1 2 3 4 5

K) Is emotionally stable, not easily upset 1 2 3 4 5

L) Can be moody 1 2 3 4 5

M) Remains calm in tense situations 1 2 3 4 5

N) Gets nervous easily 1 2 3 4 5

O) Is sophisticated in art, music, or literature 1 2 3 4 5

Have you answered all questions truthfully? YES NO

If not sure, please go back and see that your answers match the true reflection of your personality attributes.

Appendix C

Modified PANAS

This scale consists of a number of words that describe different feelings and emotions.

Read each item and then mark the appropriate answer in the space next to the word.

Indicate to what extent **'at this moment'** you feel the following.

Use the following scale to record your answers.

1

2

3

4

5

Very slightly/not at all

A little

Moderately

Quite a bit

Extremely

_____ *Interested* _____ *Irritable*

_____ *Distressed* _____ *Alert*

_____ *Excited* _____ *Ashamed*

_____ *Upset* _____ *Inspired*

_____ *Strong* _____ *Nervous*

_____ *Guilty* _____ *Determined*

_____ *Scared* _____ *Attentive*

_____ *Hostile* _____ *Jittery*

_____ *Enthusiastic* _____ *Active*

_____ *Proud*

_____ *Stressed* _____ *Afraid*

Appendix D

Modified PSS 10

For each question, please circle one from the following:

0. 1. 2. 3. 4.

Not at all Almost not at all Somewhat Fairly completely Completely

1) **At this moment**, do you feel upset because of something that happened unexpectedly? 0 1 2 3 4

2) **At this moment**, do you feel that you are unable to control the important things in your life? 0 1 2 3 4

3) **At this moment**, do you feel nervous and “stressed”? 0 1 2 3 4

4) **At this moment**, do you feel confident about your ability to handle your personal problems? 0 1 2 3 4

5) **At this moment**, do you feel that things are going your way? 0 1 2 3 4

6) **At this moment**, did you find that you could not cope with all the things that you had to do? 0 1 2 3 4

7) **At this moment**, are you able to control irritations in your life? 0 1 2 3 4

8) **At this moment**, do you feel that you are on top of things? 0 1 2 3 4

9) **At this moment**, are you angry because of things that happened that are outside of your control? 0 1 2 3 4

10) **At this moment**, do you feel difficulties are piling up so high that you cannot overcome them? 0 1 2 3 4

Appendix E

Acting Script

Confederate: 'Hi! My name is Amy Herald. I am interested in the sales job you posted in the newspaper. Ammm (pause) I am a Master's student at SJSU in the Business Department. Ammm (pause) I think I am fit for the job because I am taught by the leading business professionals who teach us the trade secrets ammm (long pause) which students from other universities may not be taught. Ammm (long pause) I am an A student and have been very punctual in submitting my papers. Ammm (pause) I think you will not regret hiring me as your sales person considering I am about to finish my Master's (pause) and will be ready to join you as soon as I am given an opportunity to start'.

1st JUDGE: 30 seconds left.

Confederate: 'Ammm (pause) I know there is a recession right now and I may not find a job easily, (pause, ammm) therefore, I am willing to work for a reasonable pay.

1st JUDGE: Time over. I was hoping you would shed more light on your previous sales experience. Also you were not confident while speaking and had a lot of amms. Moreover, it did not look like you believed in what you said and your voice trembled quite often. Your non-verbal behavior was not supporting your speech. Due to time constraints, I cannot go in more detail. We'll perform a video analysis and you'll get to know more about our feedback later.

2nd JUDGE: Ok, now is your turn to show us your mental arithmetic skills by counting backwards from 1022, in series of 13. On every mistake, you'll be asked to start again. You have one minute to get as far as you can. Ready (looking at the watch). Begin now.

Confederate: 1022----(pause) 1009-----(pause) 996----- (long pause) 985----

2nd JUDGE: Stop, start over.

Confederate: 1022.....(pause) 1009----- (long pause) 994....

2nd JUDGE: Start over again.

Confederate: 1002.....1009.....996.....983..... (long pause) 971...

2ND JUDGE: Start over.

Confederate: 1022..1009....

2nd JUDGE: Time over. I do not think you need to know how you performed. Please take your seat.