THE EFFECT OF NEUROTICISM ON REACTIVITY AND RECOVERY DURING A PAIRED COOPERATIVE TASK

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The members of the Committee appointed to examine the dissertation of JAMES HUTCHINSON find it satisfactory and recommend that it be accepted.

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THE EFFECT OF NEUROTICISM ON REACTIVITY AND RECOVERY

DURING A PAIRED COOPERATIVE TASK

Abstract

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This study examined the relationships between Neuroticism and cardiovascular and affective response to a cooperative laboratory task. Eighty-seven college undergraduate women scoring in the upper or lower tertiles on the NEO-FFI Neuroticism scale took part in a paired drawing task along with a laboratory confederate. The task had three conditions distinguished on the basis of on the confederate's interactive style: hostile, friendly, or ambiguous. SBP, DBP, MAP, and HR were measured at intervals during baseline, task, and recovery periods. Anger and anxiety were measured at baseline and during the task. Repeated-measures ANCOVA revealed that Neuroticism had an effect on affective reactivity, but not on cardiovascular reactivity. There were significant interactions between Neuroticism and condition, whereby the high-Neuroticism group showed less SBP and MAP recovery and greater anger reactivity in the hostile condition, and greater SBP and MAP recovery in the friendly condition. An ancillary mediational analysis revealed that the relationship between Neuroticism and anger reactivity was mediated by the participants' perception of the confederate's level of hostility. These results suggest that in terms of cardiovascular factors, Neuroticism is most relevant in the period following hostile and friendly social interactions, rather than during the interaction itself.

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CHAPTER ONE

INTRODUCTION

Personality and Physical Health

Increasingly, evidence supports an association between stable or chronic psychosocial characteristics and physical health. For example, individual differences such as hostility, anger proneness, and depressed mood are associated with more health problems (Miller, Smith, Turner, Guijarro, & Hallet, 1996; Suls & Bunde, 2005; Barth, Schumacher, & Herrmann-Lingen, 2004) whereas the tendency to experience positive emotion is associated with health advantages (Pressman & Cohen, 2005). Much of the contemporary personality-health literature stems from Booth-Kewley and Friedman's (1987) review of psychological predictors of coronary heart disease (CHD). The authors concluded: "modest but reliable associations exist between a number of personality variables and cardiovascular disease" (p.355). In a separate investigation Friedman and Booth-Kewley (1987) used meta-analysis to investigate whether a particular personality style is associated with increased risk of disease or illness. The authors concluded that the evidence supports the existence of a "disease-prone personality" characterized by the frequent occurrence of a variety of negative affects including anxiety, depression, hostility, and anger. This personality type was deemed to be more relevant to health than the specific underlying affects. They found the disease-prone personality type to be associated with the development of illnesses such CHD, asthma, migraines, arthritis, and ulcers.

Neuroticism

Since the work of Friedman and Booth-Kewley (1987) there has been a movement towards the identification of personality traits that link together factors associated with health outcomes. For example, researchers have been investigating the role that positive and negative affect (PA: Pressman & Cohen, 2005; NA: Suls & Bunde, 2005) play in physical health. *Neuroticism* is one personality trait broadly linked to affective valence. Neuroticism has been conceptualized as a sensitivity to aversive stimuli that affects propensity for the experience of a range of negative moods and emotions (Watson & Clark, 1984). According to Costa and McCrae (1992), people scoring high in Neuroticism have a tendency to worry and experience negative affects such as fear, sadness, and guilt, to cope poorly with stress, think irrationally, and display poor impulse control. A number of other factors have been associated with Neuroticism, including negative cognitions, negativistic appraisal of self, pessimism, low self-esteem, and feelings of life dissatisfaction (Watson & Clark, 1984). Research supports Neuroticism as heritable (Kendler, Aggen, Jacobson, & Neale, 2003) and relatively stable over time (McCrae & Costa, 1992; Eysenck & Eysenck, 1991).

Neuroticism has been identified as a broad, over-arching factor in the two most widely utilized frameworks for investigating personality: The *Big Three model* (Eysenck, 1990) and the *Five-Factor model* (McCrae & Costa, 2003). In his efforts to describe temperament in terms of its neurobiological bases, Hans Eysenck identified Neuroticism as one of three "superfactors". In neurobiological theories of personality higher Neuroticism levels represent heightened reactivity of the sympathetic nervous system. For example, Gray (1982) considers Neuroticism to be a measure of activation of the Behavioral Inhibition System, a hypothesized septo-hippocampal network associated with sensitivity to punishment cues and the inhibition of action in ambiguous

and threatening situations. In contrast with the temperament approach to personality, the trait approach exemplified by the Five-Factor model involves the utilization of structural analysis of trait descriptors taken from natural language. Despite this significant divergence in the conceptualization of personality, models derived from both trait and temperament approaches widely identify Neuroticism as a basic dimension. That is, Neuroticism is almost universally accepted as one of several higher-order dispositional variables that all individuals possess at varying levels. Being an overarching personality dimension, Neuroticism is comprised of a number of lower-order facets. Three facets that load strongly onto Neuroticism are anxiety, angry hostility, and depression, making Neuroticism a common trait linking together some of the more specific factors associated with the development of disease. Thus, it is possible that possession of high levels of Neuroticism represents the "disease-prone personality" put forth by Friedman and Booth-Kewley (1987).

Neuroticism was once considered to be related primarily to the reporting of somatic symptoms, and its association with health was believed to be due to the spurious reporting of symptoms unrelated to objective illness (Costa & McCrae, 1987). Watson & Pennebaker (1989) found that although Neuroticism was consistently correlated with self-reported physical symptoms, it was at best weakly associated with a number of objective indicators of health such as cholesterol level or frequency of hospitalization. However, Neuroticism has recently experienced a re-emergence as a putative risk factor for physical disease. This is due in part to Neuroticism's association with a variety of psychosocial vulnerability and protective factors for physical health. For example, Neuroticism is negatively correlated with dispositional optimism, a personality trait that has shown to be associated with positive health outcomes (Scheier et al., 1999; Smith, Pope, Rhodewalt & Poulton, 1989), and is positively related with various

psychosocial health risk factors such as hostility (Watson & Clark, 1992; Carmody, Crossen, & Wiens, 1989) and depression (Akiskal, Hirschfeld, & Yerevanian, 1983). In addition, in recent years a number of studies have found strong evidence linking Neuroticism to higher mortality (Wilson et al., 2004; Wilson et al. 2005; Murberg, Bru, & Aarsland, 2001; Christensen et al., 2002) and physical illness (Brickman et al. 1996; Neeleman, Bijl, & Ormel, 2004). A recent investigation found that Neuroticism prospectively predicts death from cardiovascular disease (Shipley, Weiss, Der, Taylor, & Deary, 2007). Now that a link has been confidently established between Neuroticism and objective physical health outcomes, it is necessary that the focus turn to determining the pathways involved.

Neuroticism and Daily Stress

Is higher neuroticism associated with greater frequency of stressors, and do these experiences affect health-relevant physiological responses? A handful of studies suggest that higher Neuroticism is associated with increased frequency of stressful experience. For example, individuals high in Neuroticism report experiencing more distress and daily stress than less neurotic individuals (Bolger & Schilling, 1991; Vollrath, 2000; Hutchinson & Williams, 2007). In a prospective study it was found that higher Neuroticism predicted increase in depressed mood over a 4-month period, and daily stress partially mediated this relationship (Hutchinson & Williams, 2007). However, it is unclear if Neuroticism is associated with the experience of objective stressful events, or simply the perception of the degree of threat posed by a given situation. It is possible that Neuroticism-daily hassles phenomenon is the result of a tendency for individuals high in Neuroticism to attend to negative cues and perceive threat from

environmental stimuli. If such a bias could be associated with depressive symptom development, it is possible that it also has implications for physical health.

Cacioppo and Gardner (1999) hypothesize that a *negativity bias,* or tendency to display heightened sensitivity to negative information, is beneficial to humans because: "…it is more difficult to reverse the consequences of an injurious or fatal assault than those of an opportunity unpursued" (p.205). However, the heightened vigilance for cues signaling impending danger or punishment associated with Neuroticism may represent an exaggeration of the negativity bias. In support of this idea, research suggests that higher Neuroticism levels are associated with greater negative bias and preferential processing of information related to threat (Martin, Ward, & Clark, 1983; Reed & Derryberry, 1994; Richards, French, Johnson, Naparstek, & Williams, 1992; Verhaak, Smeenk, van Minnen, & Kraaimaat, 2004). Threat appraisals increase blood pressure response to coping stressors (Tomaka, Blascovich, Kibler, & Ernst, 1997), which suggests that an overly strong negativity bias may have adverse effects on health. Although it is apparent that Neuroticism is associated with the subjective experience of stressful events, and that individuals high in Neuroticism process information differently related to the presence of potential threats, it is unclear if these factors are associated with health-related objective outcomes. Neuroticism is associated with greater negative affective reactivity in response to daily stressors (Bolger & Schilling, 1991; Suls, Green, & Hillis, 1998), but it has not yet been ascertained what implications these findings have for objective health outcomes.

The *reactivity hypothesis* suggests that stress-related physiological responses such as *cardiovascular reactivity* (CVR) are risk factors for disease development (Manuck, 1994). CVR is blood pressure and heart rate change in response to acute stressors or external stimuli (Linden, Earle, Gerin, & Christenfeld, 1997). Prospective evidence supports CVR as predictive of the

development of preclinical disease states such as hypertension, increased left ventricular mass, and reduction in endothelial integrity (Jennings et al., 1997, Carroll et al., 2001; Treiber et al., 2003; Pickering & Gerin, 1990). Hence, Neuroticism may influence health through its effect on the magnitude and frequency of occurrence of pathogenic physiological responses. If Neuroticism is found to be linked to CVR, it would place the latter as a mediator in the relationship between Neuroticism and physical health outcomes. Also of interest is whether Neuroticism is related to cardiovascular recovery following a stressful event. Cardiovascular recovery refers to the degree to which blood pressure and heart rate responses return to basal levels following a period of evoked reactivity. Slower recovery contributes to a longer total duration of heightened physiological reactivity resulting in greater cardiovascular burden. Sustained elevations of blood pressure and heart rate following a stressor have been associated with cardiovascular disease (Devereux & Pickering, 1991). There is evidence to suggest that recovery may be superior to reactivity in its ability to predict future blood pressure (Stewart, Janicki, & Kamarck, 2006). Thus, there are potential health implications if Neuroticism is found to affect cardiovascular recovery following a stressor.

Some studies have demonstrated a relationship between Neuroticism and CVR (Rollnik, Schmitz, & Kugler, 1999). However, the majority of studies in this area have produced contradictory results. For example, Schwebel & Suls (1999) found that Neuroticism was associated with HR reactivity to laboratory stressors, but not with blood pressure reactivity. Kennedy & Hughes (2004) found that Neuroticism was associated with blood pressure reactivity, but not with heart rate reactivity. Brody, Veit, & Rau (1996) found no link between Neuroticism and heart rate or blood pressure reactivity in participants carrying out a mental arithmetic task, while Kaiser, Beauvale, & Bener (1997) found that high-Neuroticism subject exhibited enhanced

heart rate reactivity to situationally-relevant stimuli. No studies found to date have examined the relationship between Neuroticism and cardiovascular recovery. Thus, this study provides an opportunity to fill a current gap in the literature.

In sum, substantial evidence has come to light indicating a relationship exists between Neuroticism and physical health, but little is known about the factors that mediate this relationship. Potential mediators include cardiovascular reactivity to stressors, and cardiovascular recovery following stressful events. Research also indicates that the negativity bias is associated with Neuroticism, and this bias may mediate the relationship between Neuroticism and cardiovascular reactivity/recovery.

Interpersonal Interactions and Reactivity

The issue of how reactivity may be affected by a particular type of stressor is an important one. Certain types of stressors tend to elicit minor reactivity responses, while others may induce relatively large reactivity responses. In the field of reactivity research it is essential that the stressor be capable of bringing about a response of appropriate magnitude. There is evidence to suggest that social stressors induce significant levels of CVR, and that different aspects of the interaction can affect the degree of reactivity. For example, the act of giving a persuasive speech induces significant levels of blood pressure and heart rate reactivity (Smith, Nealey, Kircher, & Limon, 1997), and verbal harassment during a speech task has been shown to result in greater blood pressure reactivity than supportive comments (Gallo, Smith, & Kircher, 2000). Moreover, social stressors are argued to be more ecologically valid stimuli as opposed to more traditional laboratory tasks such as mental arithmetic, cold pressors, or other non-social stressors (Ruiz, Hamann, Coyne, & Compare, 2006; Smith, Glazer, Ruiz, & Gallo, 2004). Such

evidence suggests that a socially-based stress task is appropriate for addressing the potential mechanisms by which Neuroticism is associated with cardiovascular health. However, there is a clear absence of such studies in the literature.

Proposed Model

Figure 1 shows the hypothesized model, wherein the perceptual bias associated with Neuroticism mediates the relationship between social cues and subsequent affective and cardiovascular reactivity. Pathway A shows the demonstrated relationship between Neuroticism and perceptual bias towards the appraisal of threat. Pathway B shows the putative pathway from Neuroticism to affective reactivity, with perceptual bias serving as a mediator. As previously mentioned, studies have shown that Neuroticism is associated with greater affective reactivity to stressors. Pathway C illustrates the hypothesized role that perceptual bias may play in mediating the relationship between Neuroticism and cardiovascular reactivity. Because perception is guided by cues from the environment, it is plausible that the perceptual bias associated with Neuroticism is most pronounced in situations where salient information about the threat or reward potential of a given situation is minimal (i.e., ambiguous situations).

The current study attempts to answer the question: "Does Neuroticism affect cardiovascular/affective reactivity and recovery relating to interpersonal interactions, and does a perceptual bias influence these relationships?" The experiment involved engaging female participants scoring either high or low on Neuroticism in a paired cooperative task that varied on the basis of the valence of their partner's interpersonal behavior (i.e. unambiguously friendly, unambiguously hostile, or ambiguously neutral). Systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), and heart rate (HR) were measured during a

resting baseline period, the experimental task, and a post-task recovery period. Anger and anxiety were measured by self-report before and during the task. Because the task was social in nature, interpersonal tools were used to examine perceptions of the confederate and the confederate's attitude towards the participant.

Predictions

Cardiovascular Reactivity

1. It was predicted that SBP, DBP, MAP, and HR reactivity to the task would be significantly greater in hostile condition.
2. It was predicted that SBP, DBP, MAP, and HR reactivity to the task would be significantly greater for the high-Neuroticism group than for the low-Neuroticism group.
3. It was predicted that there would be a significant Neuroticism x Condition interaction such that the high-Neuroticism group would display significantly greater SBP, DBP, MAP, and HR reactivity in the ambiguous condition than would the low-Neuroticism group, relative to the other conditions.

Affective Reactivity

1. It was predicted that reported increase in anxiety and anger during the task would be significantly greater in the hostile condition.
2. It was predicted that reported increase in anxiety and anger during the task would be significantly greater for the high-Neuroticism group than for the low-Neuroticism group.
3. It was predicted that there would be a significant Neuroticism x Condition interaction such that the high-Neuroticism group would report significantly greater anxiety and anger

in the ambiguous condition than would the low Neuroticism group, relative to the other conditions.

Cardiovascular Recovery

1. It was predicted that SBP, DBP, MAP, and HR recovery would be significantly less in the hostile condition.
2. It was predicted that SBP, DBP, MAP, and HR recovery would be significantly less in the high-Neuroticism group than in the low-Neuroticism group.
3. It was predicted that there would be a significant Neuroticism x Condition interaction such that the high-Neuroticism group would experience significantly less recovery in the ambiguous condition than would the low-Neuroticism group, relative to the other conditions.

Perceptual Bias

1. It was predicted that the high-Neuroticism group would perceive the confederate to be significantly more hostile than would the low-Neuroticism group.
2. It was predicted that perceived hostility would mediate the relationship between Neuroticism and cardiovascular/affective reactivity.

CHAPTER TWO

RESEARCH DESIGN AND METHODS

Participants

Eighty-seven women undergraduate students participated in the study. Participants were solicited to participate if they scored in the upper or lower tertiles of the NEO-FFI Neuroticism distribution of a sample screened through the Washington State University Department of Psychology undergraduate subject pool. The decision to use only female participants was made in order to reduce the number of interaction terms included in the statistical analysis, and because females tend to provide greater variance in scores on measures of Neuroticism. Participants were also screened for health conditions (e.g., taking a blood pressure medication), and asked to refrain from caffeinated beverages or tobacco products for at least one hour prior to participation. The mean age of the participants was 19.32 years. In terms of ethnic makeup, 96% identified themselves as Caucasian with the remaining 4% identifying as Hispanic.

Procedure

Participants were blocked on Neuroticism and randomly assigned to one of the three confederate feedback conditions resulting in a 2 (high vs. low Neuroticism) by 3 (hostile, friendly, or ambiguous context) between-participants design. Upon arrival to the laboratory participants were informed that the purpose of the study was to examine the effect of cooperation on cardiovascular functioning. They were told that the procedure required them to work with another person, and that the two of them would be randomly assigned to the role of communicator or drawer. A rigged drawing procedure ensured that the participant was always

assigned to the communicator role. This decision was made in order to ensure that the confederate was in a position to provide feedback to the participant as the drawer.

Baseline period

After providing informed consent and completing a questionnaire battery, the participant was informed that they would be providing some resting blood pressure measurements, and that their task partner was currently undergoing the same procedure in another room. A blood pressure cuff was then attached to the participant's non-dominant arm, and the participant was given a 10-minute baseline task in which they were asked to examine and rate pairs of pictures at 1-min intervals (Jennings, Kamarck, Stewart, Eddy, & Johnson, 1992). SBP, DBP, MAP, and HR were assessed once per minute during the last 3 minutes and aggregated to create resting physiological values against which change was later assessed. Participants then completed an affect measure from which anger and anxiety scores were calculated.

Interaction task

The interaction task was based on a cooperative paradigm previously used to examine how affiliative quality affects cardiovascular response in social interaction (Smith & Ruiz, 2007). Following the baseline, one of the two female confederates involved in the study was united with the participant, and the two were seated across from each other at a table. After the blood pressure cuff was attached to both individuals, instructions for the task were given. The rigged draw was then conducted and the participant was assigned to the communicator role. The task required the participant to give verbal directions to the confederate on how to reproduce three separate two-dimensional figures. One figure was used for each of the three trials. The figures and drawing paper were presented on separate easels, with affect-rating forms included between the pages. The easels were placed at an angle, ostensibly to obstruct the other's view of the

figures, drawings, and affect rating forms. Two minutes were provided per figure, and after each trial the page was turned and the brief affect measure completed. Valence of social interaction (the condition) was manipulated by way of scripted lines presented on the confederate's drawing paper. The lines were either unambiguously friendly (e.g., "you're really good at this") unambiguously hostile (e.g. "you're making this too difficult") or neutral/ambiguous (e.g. "hmmm"). The confederate was made aware of the condition prior to the task to allow her to match her affect appropriately. The script ostensibly followed the communicator's drawing instructions. In order to make the confederate's scripted lines more believable, it had been announced that the communicator was only to provide feedback that related to her ability to follow the instructions successfully. To reduce the risk of the participant being diverted from performing the task by the scripted lines, the participant was instructed not to provide any verbal information other than drawing instructions. The scripted lines were delivered at 20 seconds and 80 seconds of each of the three two-minute trials, for a total of six comments in each scripted condition. The confederate was cued remotely at the appropriate time by the experimenter via a concealed indicator light located under the table. The experimenter started the pressure monitors for both the participant and the confederate at the 30 second and 90 second marks of each trial, and the physiological values for the participant were recorded.

Recovery period

Immediately upon completion of the task session, it was announced that the drawer would be brought back to her original room in order to provide some more resting cardiovascular measurements. The participant was asked to relax in her chair for ten minutes so that the same measurements could be taken from her. The confederate was then led out of the room and SBP, DBP, MAP, and HR measurements were taken from the participant at two-minute intervals.

Upon completion of this recovery period, the participant completed instruments measuring her perception of the confederate's interpersonal behavior and characteristics. The participant were then debriefed and requested not to reveal the deception aspect of the study to fellow students.

Self-Report Measures

The NEO Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992). The NEO-FFI was chosen as a measure of Neuroticism for its psychometric properties and its appropriateness for use in health research. It is a 60-item self-report measure designed to assess each of the five major domains of personality including Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. Each item requires participants to respond on a 5-item Likert scale ranging from "strongly disagree" to "strongly agree". Scores are interpreted on a continuum, with higher scores indicating that the individual has a greater probability of exhibiting characteristics associated with that personality trait. For the purposes of this study, prospective participants completed only the Neuroticism portion of the NEO-FFI (12 items), and were solicited to participate if they scored within the top or bottom tertiles of the distribution. The Neuroticism scale of the NEO-FFI has demonstrated good internal consistency, with an alpha level of .86 (Robins, Fraley, Roberts, & Trzesniewski, 2001).

The Impact Message Inventory – Circumplex (IMI-C; Schmidt, Wagner & Kiesler, 1999). The IMI-C is a well-validated instrument used to assess an individual's perceptions of the social behaviors and the messages of a specific social other. Using a 1 (not at all) to 4 (very much so) Likert scale, participants rated their perceptions of the confederate on 32 items, with stems such as "this person makes me feel like…" (e.g., I should tell them they are quite inconsiderate) and "based on the interaction I just had with this person, it appears that…." (e.g.,

they don't want to be involved with me). The items are used to create an interpersonal circumplex - a conceptual tool used to assess the quality of social behaviors. Consistent with interpersonal theory, the circumplex is defined by two orthogonal axes - affiliation (how warm and friendly vs. cold and hostile) and control (how dominant vs. submissive). Through examination of scores on its affiliation dimension, the IMI-C allowed us to quantify a participant's impression of how friendly the confederate behaved towards her. The hostile octant was used to assess perception of hostile interpersonal messages.

The Interpersonal Adjective Checklist (IAC; Trapnell & Wiggins, 1990). To measure participants' impressions of the confederate's characteristics we had them complete the IAC. The IAC contains 32 adjectives. Examples include "assertive," "shy," "cruel," and "kind." The participant rates how well these adjectives describe the confederate on an 8 point Likert scale (1 - extremely inaccurate to 8 - extremely accurate). Similar to the IMI, the adjectives are scored to create 8 octant scores which are then geometrically scored (Wiggins and Broughton, 1991) to yield the two principle axes of affiliation and control. As with the IMI-C, the participants' impressions of the confederate along the affiliation (warm and friendly vs. cold and hostile) dimension were examined along with their hostile octant scores.

State Anxiety and Anger. State affect was measured using a 12-item measure (Smith, Ruiz, & Uchino, 2004) derived primarily from the State-Trait Personality Inventory (STPI; Spielberger, 1979). Anxiety was assessed using six items from the State Anxiety scale of the STPI. Anger was assessed using four items from the State Anger scale of the STPI, plus two new items. Instructions asked respondents to indicate "how are you feeling right now at this moment" on a 4-point rating scale (1 = not at all, 4 = *extremely*). Both scales had possible ranges from 6 to

24. Affect was assessed following the baseline period, and after each of the three experimental trials.

Cardiovascular Assessment

Dinamap Model Pro 100 monitor (General Electric, Miami, FL). The Dinamap was used to measure SBP, DBP, MAP, and HR. It uses the oscillometric method to estimate blood pressure. Blood pressure and HR assessments were obtained via a properly sized occluding cuff positioned on the participant's non-dominant upper-arm according to the manufacturer's specifications. As described previously, cardiovascular measures were sampled twice (at the 30 and 90 second marks) during each two-minute trial.

Analytic Strategy

To test for baseline equivalence of the experimental groups on all cardiovascular and affective indices, analysis of variance (ANOVA) was utilized. To examine the effect of the task on change on the physiological and affective indices over time, repeated-measures ANOVA was used.

As a manipulation check, ANOVA was conducted using IMI-C and IAC affiliation dimension scores as the within variables, and condition as the between variable. This was to verify that the confederate was perceived as unambiguously warm and friendly in the friendly condition and hostile and unambiguously unfriendly in the hostile condition, and that scores in the ambiguous condition fell between.

To examine the effect of Neuroticism and experimental condition on cardiovascular and affective response, and on cardiovascular recovery, separate repeated-measures analyses of

covariance (ANCOVA) were conducted on each dependent measure. ANCOVA has a robust history of use in research investigating the relationship between personality and physiological reactivity. Consistent with prior recommendations (i.e., Smith, Ruiz, & Uchino, 2004, Ruiz, Uchino, & Smith, 2006), change scores (task value – baseline value) were calculated for the cardiovascular and affective variables measured in all trials. Because baseline blood pressure and HR levels are related to reactivity during the stress response (Benjamin, 1967), baseline values were included as a covariate. We computed two-way repeated-measures ANCOVA (i.e., 2 (Neuroticism level) x 3 (condition) for each cardiovascular or affective index. Significant effects involving time were followed up by mean comparisons using pooled error terms (Bernhardson, 1975).

CHAPTER THREE

RESULTS

Baseline Equivalence of Groups

Consistent with expectations, there were no differences between conditions on any of the four physiological indices (SBP, DBP, MAP, HR) at baseline, Fs(2,83) ≤ 2.29, p=ns (Table 1). Also consistent with expectations, there were no significant differences between conditions on reported anxiety and anger levels at baseline, Fs(2,83) ≤ .373, ps=ns (Table 1). Thus, the three experimental groups did not differ significantly from one another in any of the physiological or affective variables prior to the experimental task. Interestingly, the high-Neuroticism group had a significantly higher mean HR at baseline than the low-Neuroticism group, F(1,85)=5.62, p=.020, and reported experiencing significantly higher levels of anxiety, F(1,83)=16.57, p<.001, and anger, F(1,83)=4.08, p=.047.

Stressfulness of the Task

Significant differences existed between baseline, task, and recovery periods on cardiovascular indices, Fs(2,166)≥114.02, ps<.001 (Table 2; Figure 2a). There were also significant differences between baseline and task periods for both affective indices, Fs(2,83)≥ 7.91, ps<.001 (Table 2; Figure 2b). Paired-sample t-tests were conducted to determine which changes were significant. For the cardiovascular indices, all increased significantly from baseline to task, ts(85)≥8.8, p<.001, and decreased significantly from task to recovery ts(85)≥11.32, p<.001. Both affective indices increased significantly from baseline to task, ts(83)≥6.16, p<.001.

These results indicate that in terms of both cardiovascular and reported emotional response, the cooperative task was successful in serving as a stressful experience for the participants.

Manipulation Effectiveness

Consistent with expectations, the three experimental conditions differed significantly in their IAC affiliation ratings of the confederate's characteristics, $F(2,83)=146.02$, $p<.001$. Post hoc analysis revealed that IAC affiliation scores in the friendly condition were greater than in the ambiguous condition, $t(80)=41.86$, $p<.001$, and that the scores in the ambiguous condition were significantly greater than in the hostile condition, $t(80)=70.37$, $p<.001$. Also consistent with predictions, the conditions differed significantly in their effect on IMI-C affiliation ratings of the confederate's interpersonal behavior, $F(2,85)=170.12$, $p<.001$. As was the case with the IAC affiliation scores, post hoc analysis revealed that IMI-C affiliation scores in the friendly condition were greater than in the ambiguous condition, $t(80)=30.04$, $p<.001$, and that the scores in the ambiguous condition were significantly greater than in the hostile condition, $t(80)=21.14$, $p<.001$ (Figure 3). These results indicate that the manipulation was effective in creating differing perceptions of the confederate's interpersonally-relevant behavior and how the confederate viewed the participant, depending on condition.

Also as predicted, the conditions differed in their effect on SBP, DBP, MAP, and HR response from baseline to task, Fs$(2, 82)\geq 3.98$, $p\leq .022$ (Table 3). Post hoc analysis showed that the hostile condition produced greater cardiovascular response than both the friendly and ambiguous conditions on three of the four indices. For SBP, the hostile condition produced greater response than the friendly condition, $t(79)=1.95$, $p=.027$, and the ambiguous condition, $t(79)=2.31$, $p=.012$. The hostile condition produced a greater MAP response than the friendly

condition, $t(79)=1.75$, $p=.042$, and the ambiguous condition $t(79)=2.70$, $p=<.0042$. In terms of HR, the hostile condition produced a greater response than the friendly condition, $t(79)=2.43$, $p=.0087$, and the ambiguous condition, $t(79)=3.44$, $p<.001$. The hostile condition also produced greater DBP response than the ambiguous condition, $t(79)=2.11$, $p=.0018$. Overall, there was a general trend for the greatest reactivity to occur within the hostile condition, and the least reactivity to occur within the ambiguous condition (Figure 4).

The conditions also differed significantly in their effect on self-reported anger response, $F(2,77)=31.67$, $p<.001$, and anxiety response, $F(2,80)=7.17$, $p=.001$, from baseline to task (Table 3). Post hoc analysis revealed that the hostile condition produced more reported more anger change than did the friendly condition, $t(77)=5.36$, $p<.001$, and ambiguous condition, $t(77)=4.31$, $p<.001$. The hostile condition also produced more reported change in anxiety than did the friendly condition, $t(77)=2.58$, $p<.0059$, and ambiguous condition, $t(77)=2.05$, $p=.022$ (Figure 5).

In sum, the results indicate that the manipulation was successful in its primary responsibility of inducing distinct differences in the degree of perceived friendliness of the confederate. The effect of the manipulation on reactivity was less consistent. The hostile condition induced the greatest cardiovascular response, with a general trend for the friendly condition to induce more cardiovascular response than the ambiguous condition. The hostile condition induced the greatest anger and anxiety response, while the differences between the friendly and ambiguous conditions were not significant.

Cardiovascular Reactivity to the Task

Despite the effectiveness of the manipulation, no significant relationships were found between Neuroticism and the cardiovascular indices during the task.

Affective Reactivity to the Task

Neuroticism was found to significantly affect reported change in anger, $F(2,77)=6.71$, $p=.011$, and reported change in anxiety, $F(2,77)=6.95$, $p=.010$ (Figure 6). As expected, the high-Neuroticism group reported experiencing greater increases in anxiety (4.59 vs. 2.77) and anger (3.55 vs. 1.82) than did the low-Neuroticism group. In addition, there was evidence that Neuroticism interacted with condition. Although the interaction terms for the effect of experimental condition and Neuroticism on reported affect change were not significant, the Neuroticism x Condition interaction approached significance in its effect on anger, $F(2,77)=2.31$, $p=.11$ (Figure 7). Post hoc analysis revealed a significant interaction, whereby the high-Neuroticism group reported greater anger response in the hostile condition than did the low-Neuroticism group, $t(77)=3.30$, $p<.001$.

Cardiovascular Recovery following the Task

There was a significant effect of condition on SBP recovery, $F(2,79)=12.16$, $p<.001$, DBP recovery, $F(2,79)=5.67$, $p=.005$, MAP recovery $F(2,78)=11.70$, $p<.001$, and HR recovery, $F(2,79)=5.31$, $p=.007$ (Table 4). Post hoc analysis revealed that for SBP, the hostile condition maintained greater elevations on this index from baseline to recovery than did the friendly condition, $t(79)=2.93$, $p=.0022$, and the ambiguous condition, $t(79)=3.28$, $p<.001$. Similar results were found for DBP (friendly: $t(79)=2.11$, p=.019, ambiguous: $t(79)=2.09$, $p=.02$), MAP (friendly: $t(79)=2.49$, $p=.0074$, ambiguous: $t(79)=3.08$, p=.0014), and HR, (friendly: $t(79)=1.76$, p=.041, ambiguous: $t(79)=2.24$, $p=.014$).

No main effects of Neuroticism were found despite predictions to the contrary. However, significant interactions between Neuroticism and condition were found for SBP recovery,

$F(2,79)=3.77$, $p=.027$ (Figure 8a), and MAP recovery, $F(2,78)=3.11$, $p=.050$ (Figure 8b). In the case of SBP recovery, the high-Neuroticism group maintained a significantly greater elevation on this index than the low-Neuroticism group in the hostile condition, $t(79)=1.73$, $p=.044$. Interestingly, the low-Neuroticism group maintained a greater SBP elevation than the high-Neuroticism group in the friendly condition, $t(79)=2.21$, $p=.015$. In terms of MAP recovery, the high-Neuroticism group maintained greater elevation than the low-Neuroticism group in the hostile condition, $t(79)=2.20$, $p=.015$.

Mediational Analysis

In order to examine the role that perception of the confederate might have played in the relationship between Neuroticism and affective reactivity to the task, a mediational analysis was conducted. Examination of the correlations between participants' Neuroticism and their perceptions of the confederate's interpersonal characteristics and behavior revealed the strongest association was with IAC hostility octant score ($r=.256$, $p=.018$). In addition, ANOVA revealed a significant effect of Neuroticism on this IAC variable, $F(1,80)=8.06$, $p=.006$, but not on IMI-C hostility octant score. Thus, it was hypothesized that participants' perceptions of the confederate's hostile characteristics, as measured by the IAC, would mediate the effect of Neuroticism on reported affect change during the cooperative task.

Multiple regression was utilized to test for mediation. For mediation to be considered as a possibility, both Neuroticism and IAC hostility must both predict reported change in affect. Neuroticism significantly predicted reported mean change in anger, $t=1.97$, $\beta=.22$, $p=.05$, but not mean change in anxiety. Therefore, reported anxiety change was discarded from the analysis. IAC hostility significantly predicted mean reported change in anger, $t=9.79$, $\beta=.73$, $p<.001$. The

next step in the analysis was to test if Neuroticism significantly predicted the hypothesized mediator (IAC hostility). This proved to be the case, t=2.42, β=.26, p=.02. The final step in the meditational analysis was to determine if the Neuroticism's ability to predict reported change in anger decreased to an insignificant level when the proposed mediator was added to the regression equation. When both Neuroticism and IAC hostility were included in the regression model, Neuroticism no longer significantly predicted reported mean change in anger t=.40, β=.03, p=ns. The Goodman test for mediation (Baron & Kenny, 1986) was run subsequent to the aforementioned analysis, and was also found to be significant, p=.018.

CHAPTER FOUR

DISCUSSION

A growing body of evidence supports Neuroticism as a causal influence on disease risk, particularly CHD morbidity and mortality. The current study examined the relationship between Neuroticism and cardiovascular reactivity and recovery as potential mechanisms underlying this relationship. Participants engaged in a paired cooperative task wherein the interpersonal behavior of the confederate was manipulated to create hostile, friendly, or ambiguous social environments.

In terms of the manipulation, it was predicted that the hostile condition would produce the greatest cardiovascular and affective reactivity to the task, and the lowest degree of cardiovascular recovery. In terms of Neuroticism, it was hypothesized that high Neuroticism would be associated with greater cardiovascular and affective reactivity, and with lesser cardiovascular recovery. It was also hypothesized that Neuroticism would have a greater effect on reactivity in the ambiguous condition due to the absence of clear social cues. In terms of the relationship between Neuroticism, perceptual bias, reactivity, and recovery, it was hypothesized that Neuroticism would be associated with a negative bias in the perception of the interaction with the confederate, and that this would serve to mediate the effect of Neuroticism on response.

Stressful of the Task/Manipulation Effectiveness

In order for the manipulation to be effective, the interaction task needed to: a) be sufficiently stress-inducing in terms of both cardiovascular and affective response, and b) provide conditions that produced qualitatively different perceptions of the characteristics and behavior of the confederate with whom the participants were paired. The results showed that in

terms of the stressfulness of the task, there was an increase in all cardiovascular and affective indices during the cooperative task. There was also a decrease in all cardiovascular indices during the post-task recovery period. In addition, the experimental conditions all differed significantly in their effect on participant ratings of the friendliness of the confederate. The friendly condition produced the highest mean affiliation score, the hostile condition produced the lowest mean affiliation score, and the ambiguous condition produced a mean affiliation score that fell in between the two. This indicates that the manipulation had strong face validity in terms of the way the confederate's interpersonal behavior and characteristics were perceived in the different conditions.

Task Condition and Reactivity/Recovery

Consistent with predictions, the hostile condition produced the greatest overall cardiovascular and affective response. The hostile condition showed greater SBP, MAP, and HR response than both of the other conditions, and greater DBP response than the ambiguous condition. The hostile condition also produced greater anger and anxiety response than the other two conditions. In terms of recovery, the hostile condition produced more sustained elevations than the other two conditions on all of the cardiovascular indices.

Neuroticism and Cardiovascular Reactivity

One of the aims of the study was to determine if Neuroticism affects cardiovascular reactivity to a social stressor. Contrary to predictions, no significant relationships were found between Neuroticism and CVR during the task. Although the hypotheses related to Neuroticism and cardiovascular reactivity were not supported, the results are consistent with a number of

previous studies that have demonstrated the absence of such relationships. In terms of this study, it is possible that the task was sufficiently intense to produce a generally strong response in the majority of participants, resulting in a "ceiling effect" that precluded the ability to detect the effect that Neuroticism has on cardiovascular reactivity. That is, the cardiovascular response that occurs during a sufficiently intense social interaction may be such that individual differences do not have much room to exert a significant effect.

Also contrary to predictions, there were no significant differences in cardiovascular reactivity between the two Neuroticism groups in the ambiguous condition. It may have been that the ambiguous condition was too benign to attract the participants' attention while they were engaged in the task. However, this explanation is not strongly supported, as the ambiguous condition produced confederate affiliation ratings that fell solidly between those produced by the friendly and hostile conditions, while Neuroticism had no effect on these variables. Therefore, it is more logical to conclude that the absence of clear social cues is not significantly relevant to Neuroticism in terms of cardiovascular response to a social stressor of this magnitude. Again, it is possible that a less intense social stressor would allow for the effect of Neuroticism or an interaction with condition to be observed.

Neuroticism and Cardiovascular Recovery

Neuroticism did not exhibit a main effect on cardiovascular recovery, which ran counter to predictions. However, there was a significant interaction between Neuroticism and experimental condition, whereby the high-Neuroticism group showed less SBP and MAP recovery in the hostile group, and greater SBP recovery in the friendly group. It is possible that once a sufficiently aversive stressor (e.g. a hostile or unpleasant interaction) has been removed,

individuals high in Neuroticism ruminate longer over negative events or analyze them more critically, resulting in an extended stress response that slows return to baseline. In addition, it is also possible that these individuals do not maintain arousal following positive interactions because they tend to appraise them as having less potential for reward than do those who score low in Neuroticism. It is unclear if there are different health implications for sustained arousal following a positive encounter versus sustained arousal following a negative interaction.

It was interesting to observe that the ambiguous condition was the only one of the three conditions that showed no significant differences between the two Neuroticism groups in terms of SBP recovery. This suggests that Neuroticism is more relevant in situations involving clear social cues, as opposed to those situations that are lacking in salient information about the hostility or friendliness of others. The evidence suggests that Neuroticism is not significantly associated with a bias in the perception of ambiguous social cues or in cardiovascular reactivity to a social stressor. Rather, it appears that Neuroticism affects the amount of time it takes for one to recover SBP following a clearly negative or positive interaction. Based on the evidence from this investigation, Neuroticism is potentially most relevant to cardiovascular health in the time following clearly-valenced social interactions.

Neuroticism and Affective Reactivity

Consistent with predictions, Neuroticism was found to significantly affect change in both anger and anxiety during the experimental task. The interaction term for Neuroticism and Condition was marginally significant in its effect on anger reactivity, but this involved only the hostile condition. This finding is in line with the cardiovascular recovery findings, in that it implies that Neuroticism exerts an effect relating to interactions in which the other individual is

clear in her attitudes and behavior towards the participant. The absence of any significant differences between the Neuroticism groups in the friendly condition suggests that in terms of emotional response hostility may be more salient than friendliness for individuals high in Neuroticism. However, as mentioned previously friendly social interactions also appear to be relevant to cardiovascular recovery.

Neuroticism, Hostility, and Anger Reactivity

Because no significant relationships were found to exist between Neuroticism and cardiovascular reactivity, the mediational analysis was limited to the examination of affective reactivity. Perceived hostility in the confederate was found to partially mediate the relationship between Neuroticism and anger reactivity during the task. These findings suggest once more that hostile interactions are more relevant than friendly and ambiguous ones when considering the effect Neuroticism has on negative affective response. It can be hypothesized that the high Neuroticism group's tendency to perceive more hostility in the confederate resulted in a greater anger response and subsequent delay in recovery of SBP and MAP. If this hypothesis proves to be accurate, it suggests a possible pathway through which Neuroticism may affect an objective health outcome (sustained elevation in blood pressure).

Implications

The findings of this study contribute to the personality and health literature. As was expected, Neuroticism had an effect on anger and anxiety response. However, this affective reactivity did not translate to differences in acute cardiovascular reactivity, although some evidence was found for a relationship between Neuroticism and delayed recovery.

These results suggest that it may be advisable to direct attention away from reactivity and towards recovery when considering possible links between Neuroticism and cardiovascular health. It may be that Neuroticism influences cardiovascular health not during a stressful social experience, but rather during the time following the stressor's cessation. Since unpleasant interactions may end relatively quickly as the individuals involved seek to avoid associated aversive emotions, recovery may have a more significant role in objective health outcomes than reactivity when considering Neuroticism. The results of this investigation suggest that it is beneficial for clinicians to teach cardiovascular patients high in Neuroticism more adaptive means of coping with the negative cognitions and emotions that arise following interpersonal conflict. In addition, the findings indicate that individuals high in Neuroticism should be provided with social skills training to assist in the circumvention of potential negative social interactions.

Neuroticism has long been associated with greater experience of a variety of negative mood states and cognitions. The mediation analysis revealed that individuals high in Neuroticism tended to develop more hostile impressions of others during social interactions, and that this hostility resulted in a greater anger response. It is unclear at this point how this finding relates to objective health outcomes. However, the revelation that the high-Neuroticism group did not recover SBP and MAP to the same degree as the low-Neuroticism group in the hostile condition

suggests Neuroticism may affect blood pressure recovery through its affect on perception of hostility and subsequent anger response. This study provides preliminary evidence that social cues, particularly hostile ones, are most relevant when considering the potential relationships between Neuroticism and cardiovascular health.

Limitations

Of course, this is but a single study that has both strengths and weaknesses. One limitation of this investigation is its use of a relatively homogeneous group of female participants. Although the methodological rationale for implementing only female participants was sound, this choice does not allow us to generalize the results to males or older populations. It is possible that biological and/or socialization forces may lead males to respond emotionally or physiologically in a manner distinct from that of females during interpersonal interactions. Additionally, the dynamics of mixed-gender interactions may be qualitatively different from those of same-gender interactions. Future research in this area should examine the relationships between Neuroticism, reactivity, and recovery in male-male interactions as well as in female-male interactions. Also worth considering is the relationship between age and cardiovascular functioning. Use of a population with greater variance in age and health may have allowed for any effects of Neuroticism on cardiovascular reactivity to be identified.

Another limitation is the artificial nature of the interaction environment used in the experiment. Although effort was made to create as authentic a presentation of the confederate as possible, it is clear that the task does not simulate a typical daily interaction between strangers. In a real-world setting, the participant would typically be able to evade engagement with or respond in kind to a stranger who was becoming hostile, further build rapport with an openly friendly

individual, or seek clarification from a person providing ambiguous cues. Allowing for such freedoms on the part of the participant would have made the creation of a sufficiently controlled task environment impossible. Thus, despite the authenticity of manipulation, it is unclear the degree to which these results can be generalized to interactions occurring in daily life.

A third limitation concerns the reporting of affect. While cardiovascular reactivity and recovery are considered to be objective measures, self-reported anger and anxiety are subjective measures that may be affected by participant bias. It is known that Neuroticism is associated with a tendency to over-report symptom. Thus, it is possible that individuals in the high-Neuroticism group expressed experiencing a greater degree of anger and anxiety than those in the low-Neuroticism group despite actually experiencing a comparable level of emotional arousal. This makes it difficult to conclude that the differences found on self-reported variables actually represent differences in emotional experience. In the case of this study, it is possible to conclude that high-Neuroticism individuals experience greater emotional reactivity during hostile interactions without a corresponding increase in physiological reactivity, but it is also possible that these affective differences were not experientially different to a significant degree.

The final limitation addressed here is the high degree of arousal that was stimulated by the experimental manipulation. Neuroticism was not found to be related to cardiovascular reactivity, a finding which is consistent with some past findings and inconsistent with others. It is possible that the experimental task induced sufficient cardiovascular response to create a "ceiling effect" whereby all individuals were induced to respond to such a degree that the effect of personality could not be detected. The interactions that occur on a daily basis are typically less arousing, and such events may allow for a significant effect of Neuroticism to be observed.

Future studies should examine the relationships between Neuroticism, reactivity, and recovery relating to milder social interactions.

Directions for Future Study

In the future it will be important to determine the nature of the mechanism by which Neuroticism interacts with valence of social interaction to affect blood pressure recovery. It is possible that highly neurotic individuals spend more time ruminating over and analyzing negative social interactions after they have concluded, and less time considering the potential rewards of positive ones. Investigations that examine the cognitions and emotions related to Neuroticism following positive and negative encounters will provide information about the psychological factors that contribute to these observed cardiovascular differences. Based on the findings of this study, it will be particularly important to learn more about the role that anger and perceived hostility play in this area.

The results of this investigation do not preclude further study into the relationship between Neuroticism and cardiovascular reactivity. Although no relationships were found between Neuroticism and CVR in the current study, this may have been due to the highly-arousing nature of the manipulation or the overall young age and strong health of the population. Future studies could examine the relationship between Neuroticism and CVR following social interactions of less intensity, or in older, less healthy populations.

A question that could not be investigated in the current study is if there are gender differences in the effect that Neuroticism has on reactivity and recovery. Future studies should utilize larger sample sizes that allow for additional analyses of Neuroticism's effect during male-male and cross-gender interactions. In terms of increasing the ecological validity of the findings,

it may be useful to develop experimental manipulations that produce more natural, less constraining environments that better simulate social interactions in the real world.

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APPENDIX

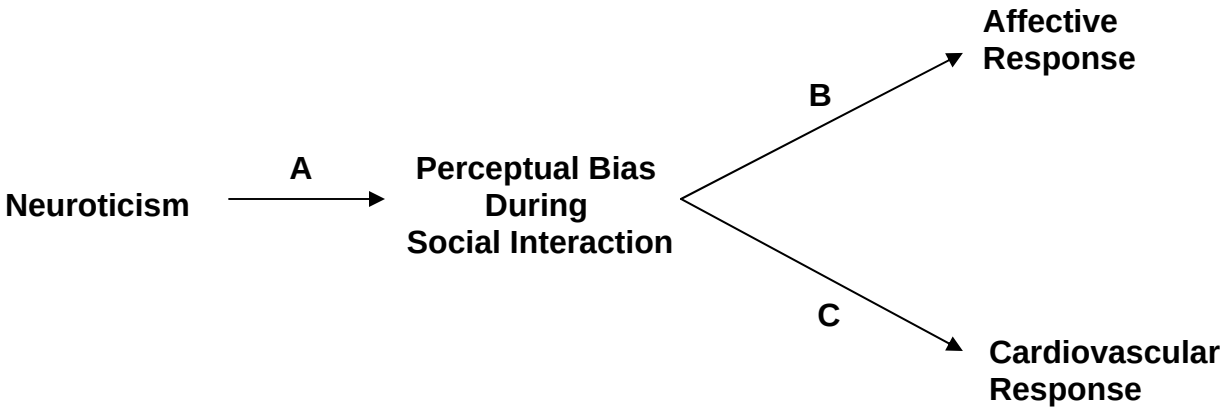

Figure 1. Model Illustrating the Hypothesized Relationship between Neuroticism, Perceptual Bias, and Affective and Cardiovascular Response to a Social Stressor

	Hostile	Friendly	Ambiguous	F	Effect Size (η^2)
SBP (mmHg)	101.66 (1.55)	105.53 (1.53)	104.06 (1.53)	1.61	.04
DBP (mmHg)	65.16 (1.04)	66.05 (1.02)	66.08 (1.02)	.26	.01
MAP (mmHg)	80.63 (.97)	82.33 (.95)	81.95 (.95)	.87	.02
HR (bpm)	72.41 (2.20)	69.70 (2.16)	76.21 (2.16)	2.29	.05
Anxiety	10.75 (.49)	10.43 (.49)	10.86 (.49)	.21	.01
Anger	9.79 (.33)	9.93 (.33)	10.18 (.33)	.69	.01

Table 1. Baseline Equivalence of Conditions on Cardiovascular and Affective Indices

	Baseline	Task	Recovery	*F*	*p*	Effect Size (η^2)
SBP (mmHg)	103.77 (.89)	122.26 (1.17)	109.17 (1.03)	277.47	<.001	.77
DBP (mmHg)	65.77 (.59)	77.19 (.72)	68.82 (.62)	259.48	<.001	.75
MAP (mmHg)	81.65 (.55)	93.07 (.70)	84.61 (.55)	286.61	<.001	.77
HR (bpm)	72.78 (1.27)	83.25 (1.65)	71.78 (1.28)	91.23	<.001	.63
Anxiety	10.68 (2.79)	14.48 (.41)		117.07	<.001	.59
Anger	9.96 (.19)	12.66 (.45)		37.91	<.001	.31

Table 2. Effect of Task on Cardiovascular and Affective Variables

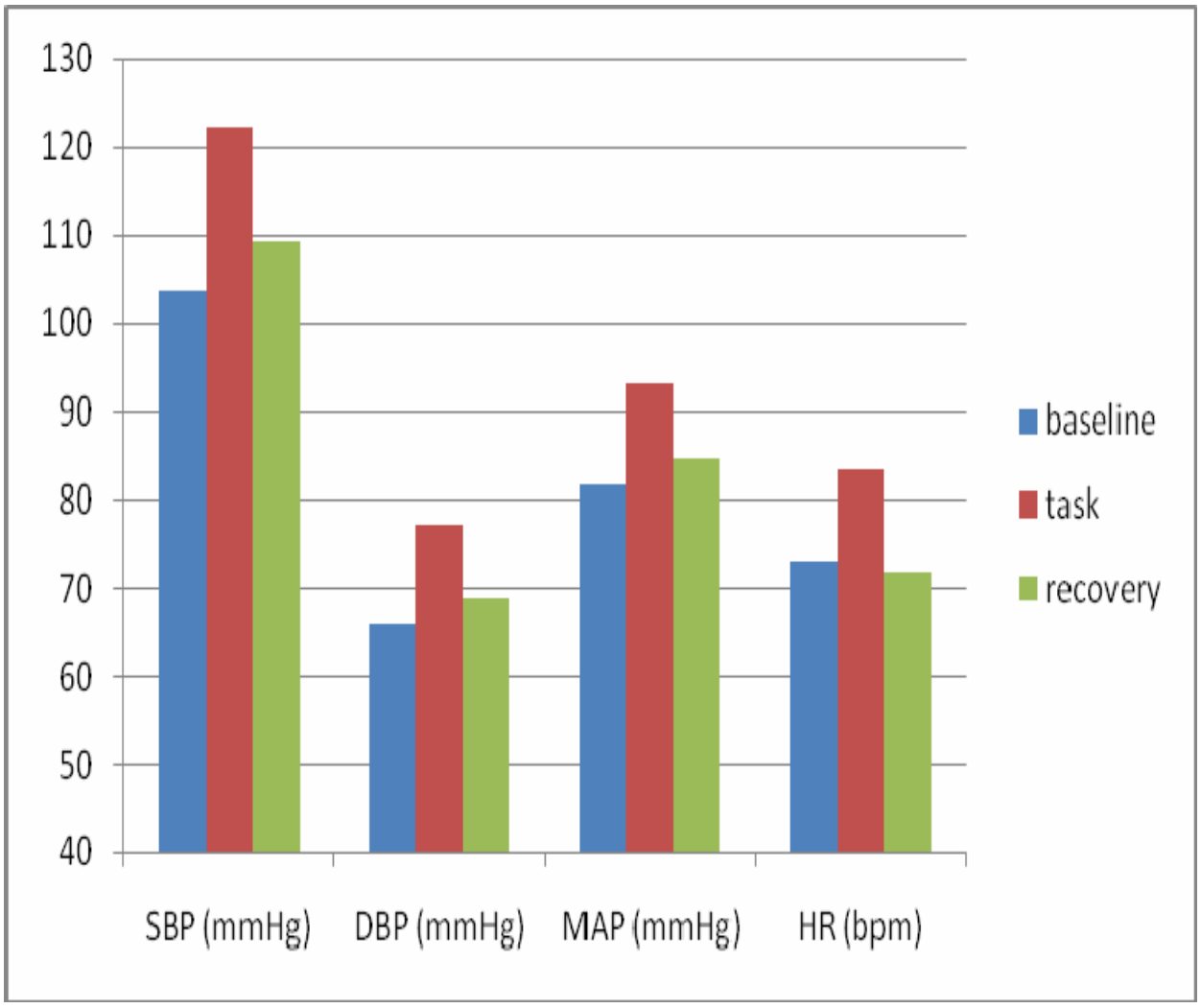

Figure 2a. Mean Values for Cardiovascular Indices during Baseline, Task, and Recovery Periods

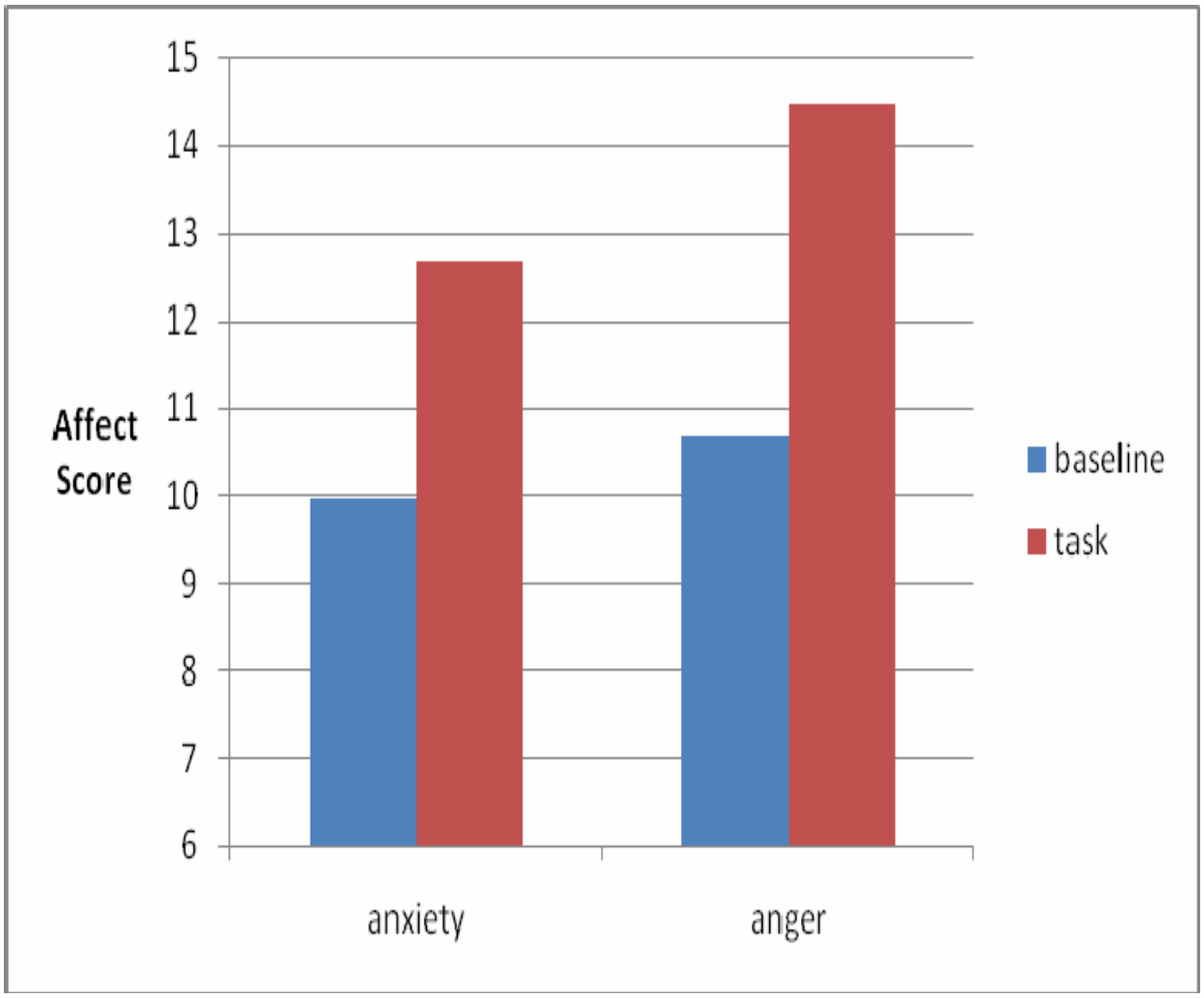

Figure 2b. Mean Values for Affective Indices during Baseline and Task Periods

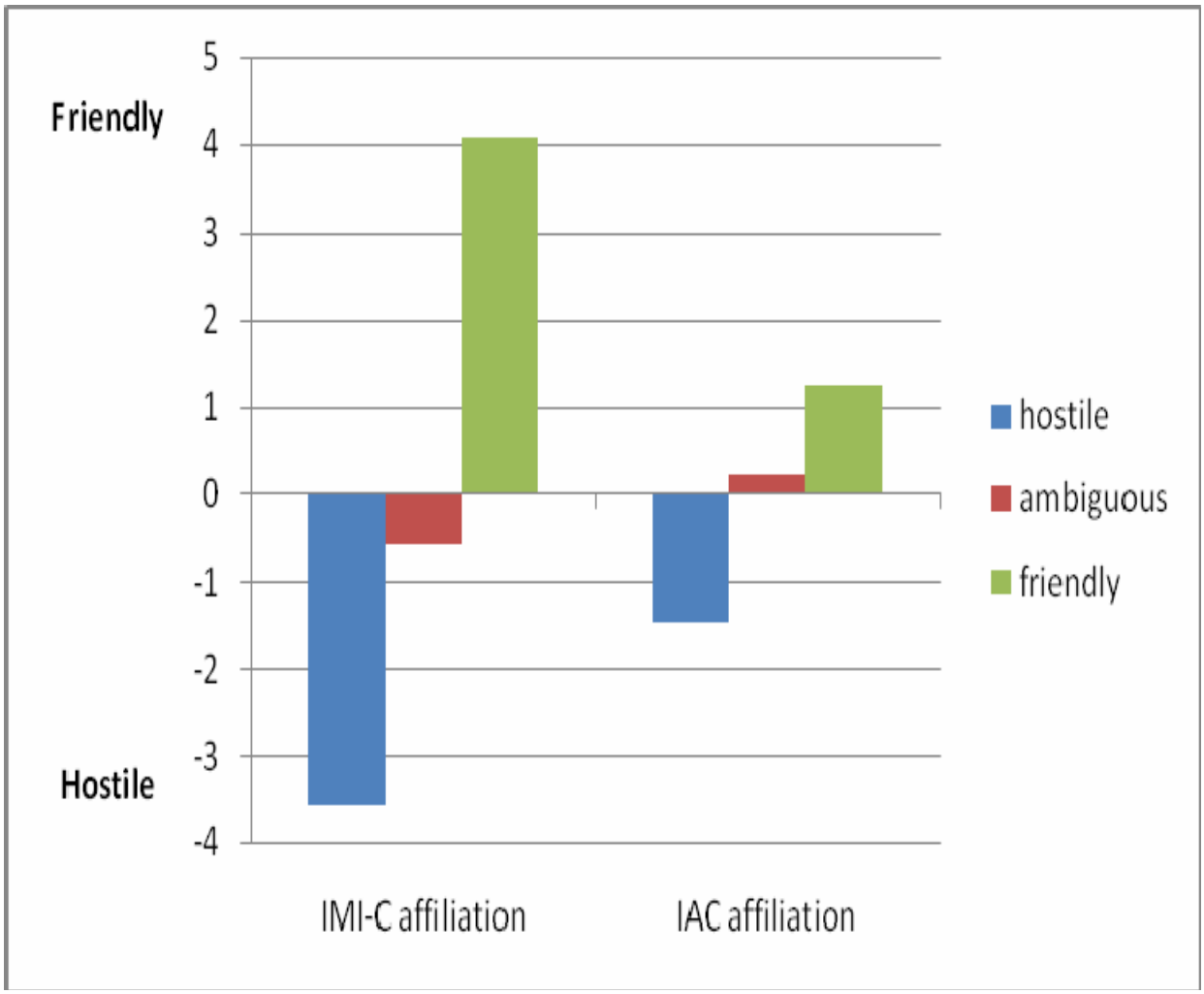

Figure 3. Effect of Condition on Participant's IMI-C Affiliation and IAC Affiliation Ratings of Confederate

	Hostile Condition	Friendly Condition	Ambiguous Condition	*F*	*p*	Effect Size (η^2)
SBP Change (mmHg)	23.04 (1.65)	16.76 (1.64)	15.58 (1.68)	5.79	.004	.128
DBP Change (mmHg)	13.38 (1.00)	11.24 (1.00)	9.21 (1.03)	4.21	.018	.096
MAP Change (mmHg)	14.18 (.99)	10.79 (.98)	8.95 (1.01)	7.07	.002	.152
HR Change (bpm)	17.76 (1.86)	8.84 (1.87)	5.15 (1.94)	11.84	<.001	.231
Anger Change	6.28 (.56)	.31 (.56)	1.47 (.60)	31.67	<.001	.451
Anxiety Change	5.37 (.55)	2.54 (.56)	3.12 (.59)	7.17	.001	.157

Table 3. Effect of Condition on Change in Cardiovascular and Affective Indices from Baseline to Task

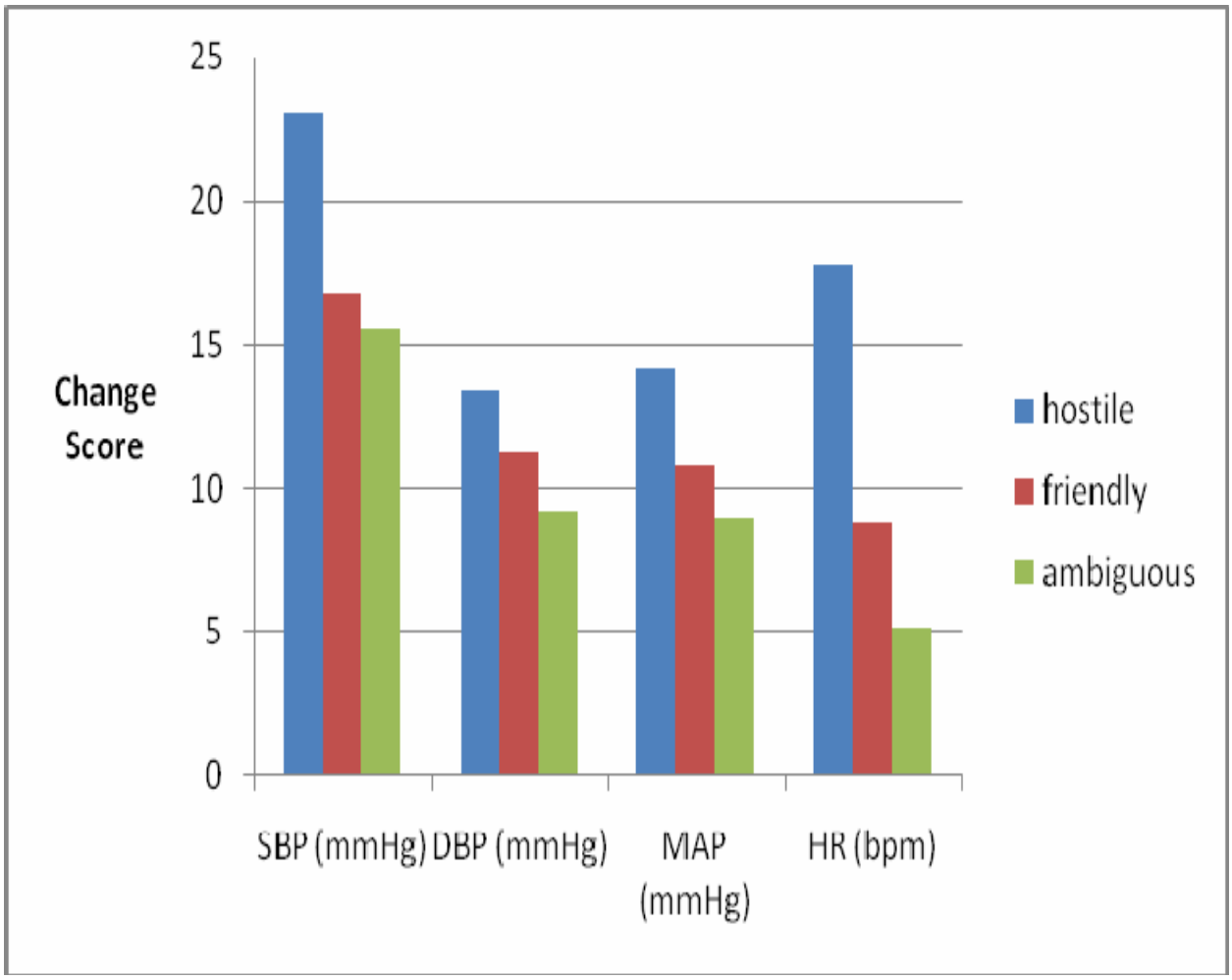

Figure 4. Effect of Condition on Change in Cardiovascular Indices from Baseline to Experimental Task

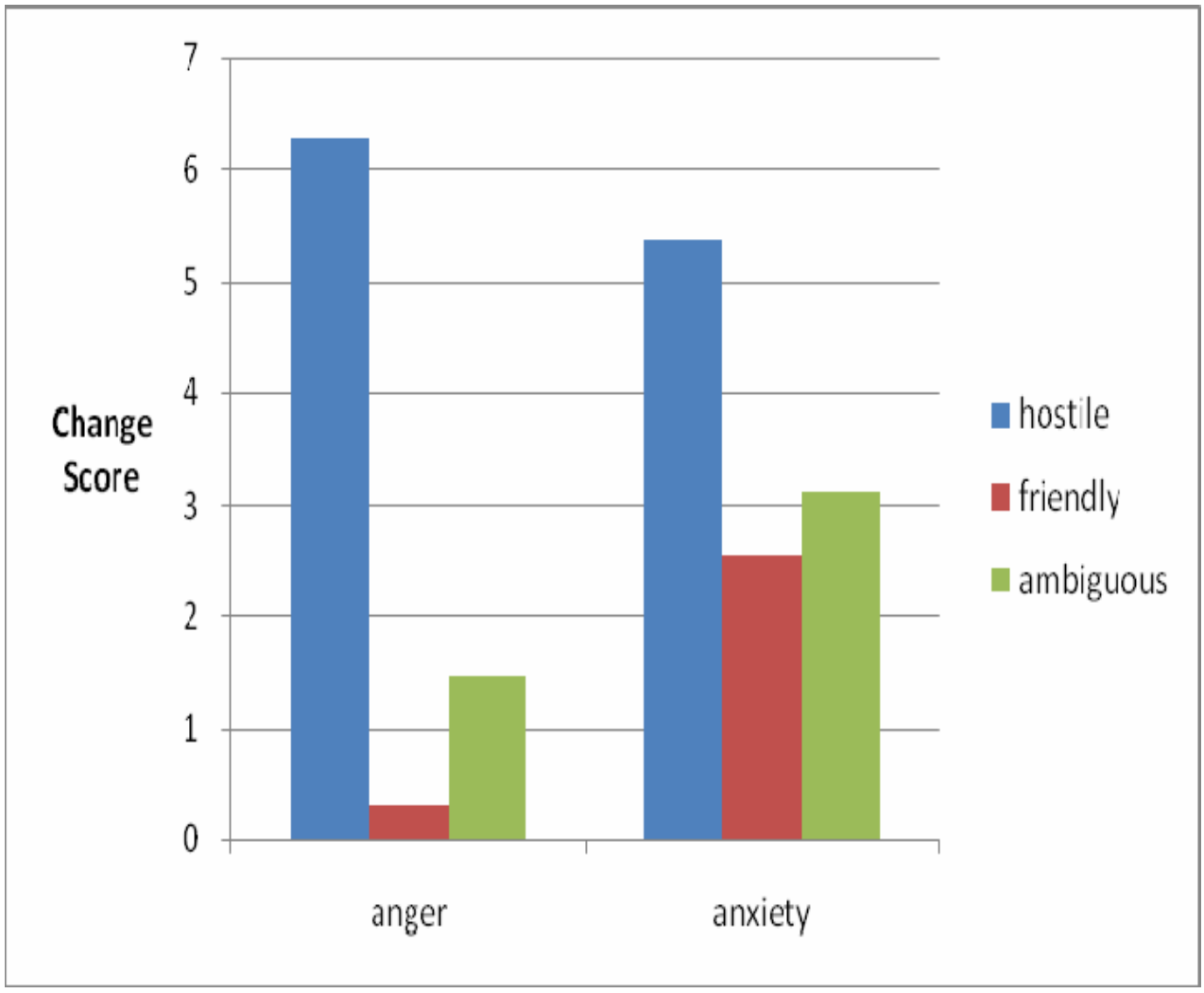

Figure 5. Effect of Condition on Reported Change in Anger and Anxiety from Baseline to Task

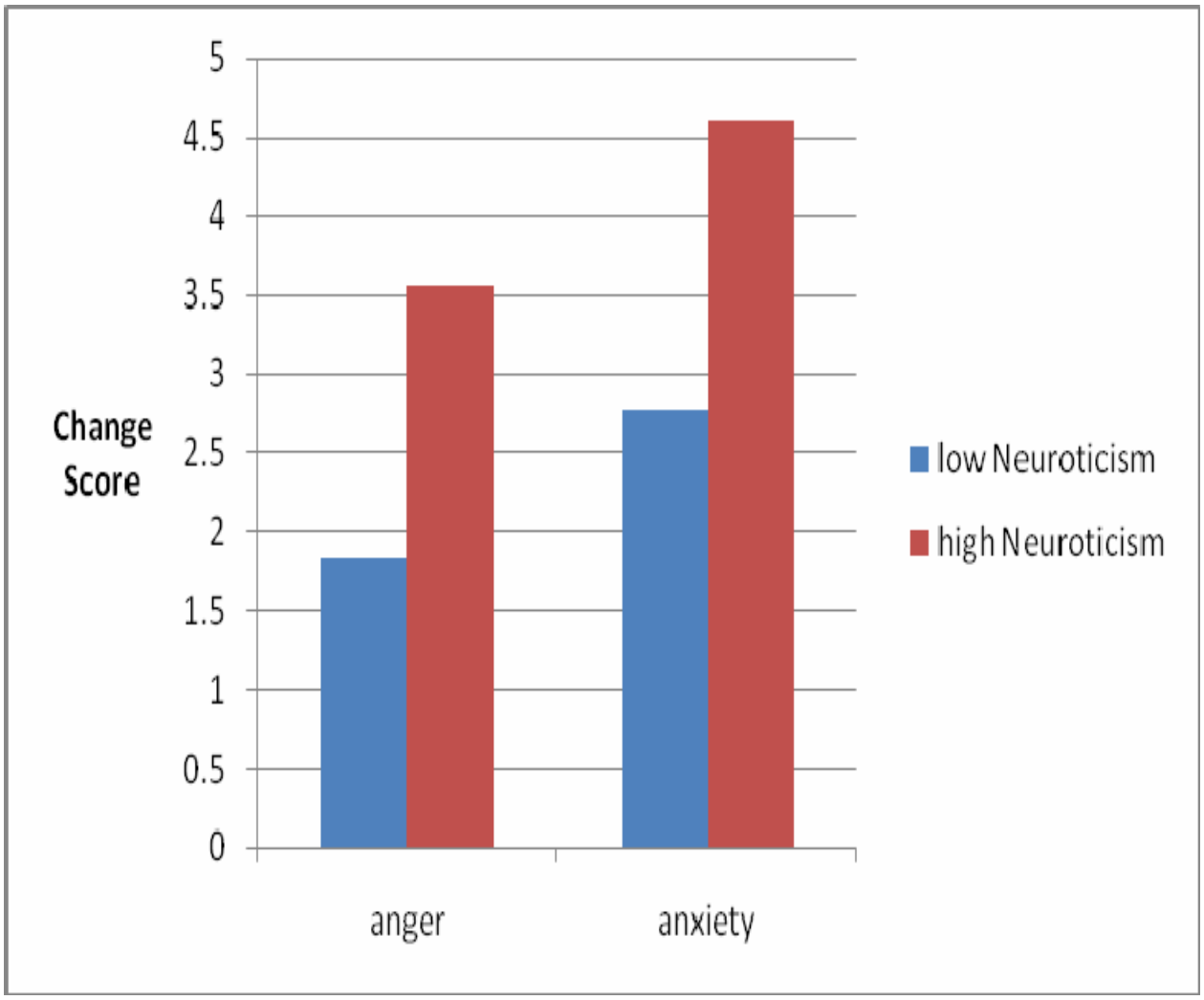

Figure 6. Effect of Neuroticism on Reported Change in Anger and Anxiety from Baseline to Task

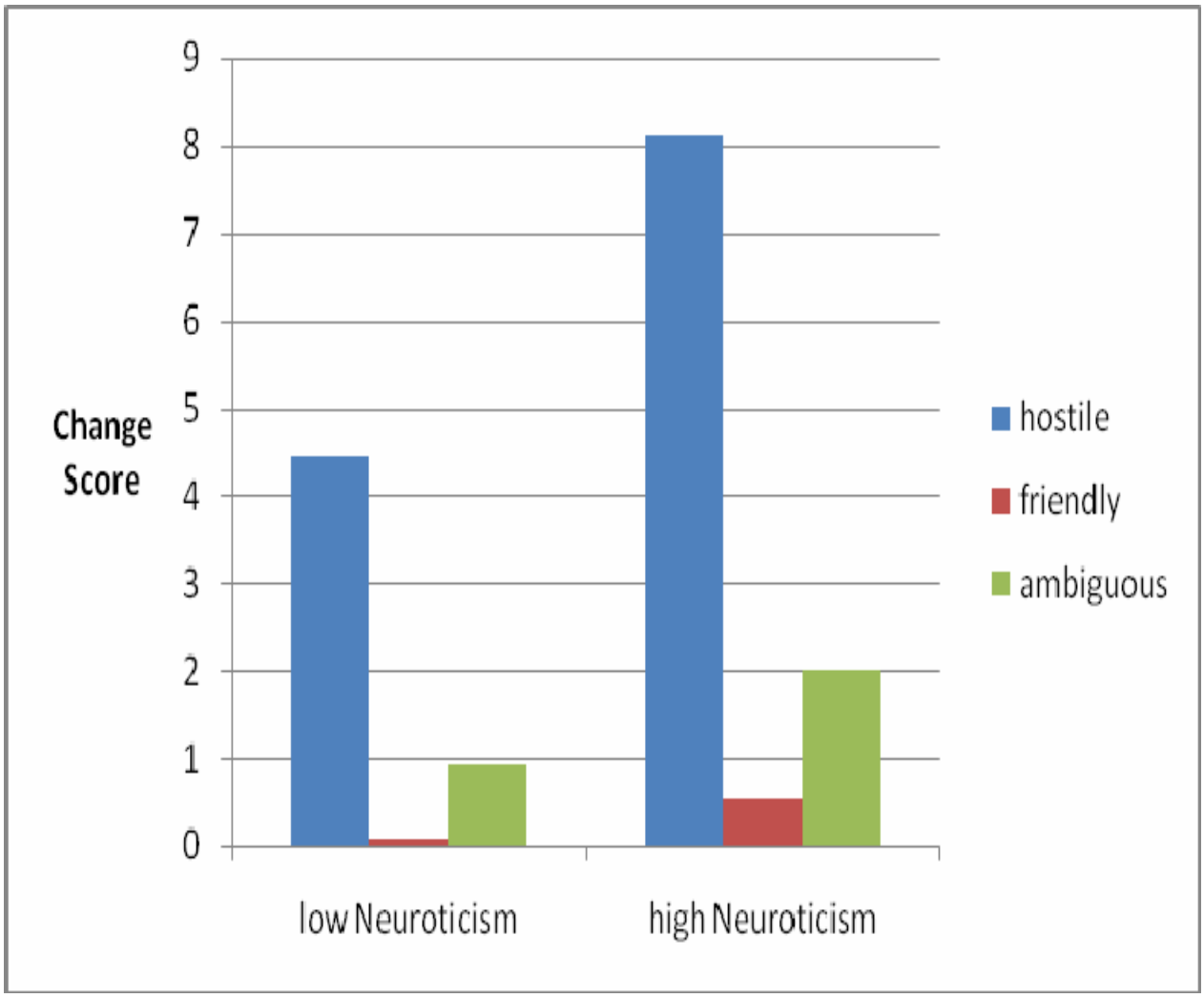

Figure 7. Interaction between Neuroticism and Condition on Reported Change in Anger from Baseline to Task

	Hostile Condition	Friendly Condition	Ambiguous Condition	*F*	*p*	Effect Size (η^2)
SBP Change (mmHg)	9.61 (1.05)	3.62 (1.04)	2.91 (1.07)	12.16	<.001	.235
DBP Change (mmHg)	4.89 (.65)	2.21 (.64)	2.23 (.67)	5.67	.005	.126
MAP Change (mmHg)	5.21 (.55)	2.32 (.55)	1.65 (.56)	11.70	<.001	.229
HR Change (bpm)	1.13 (.79)	-1.45 (.78)	-2.44 (.81)	5.40	.006	.120

Table 4. Effect of Condition on Change in Cardiovascular Indices from Baseline to Recovery

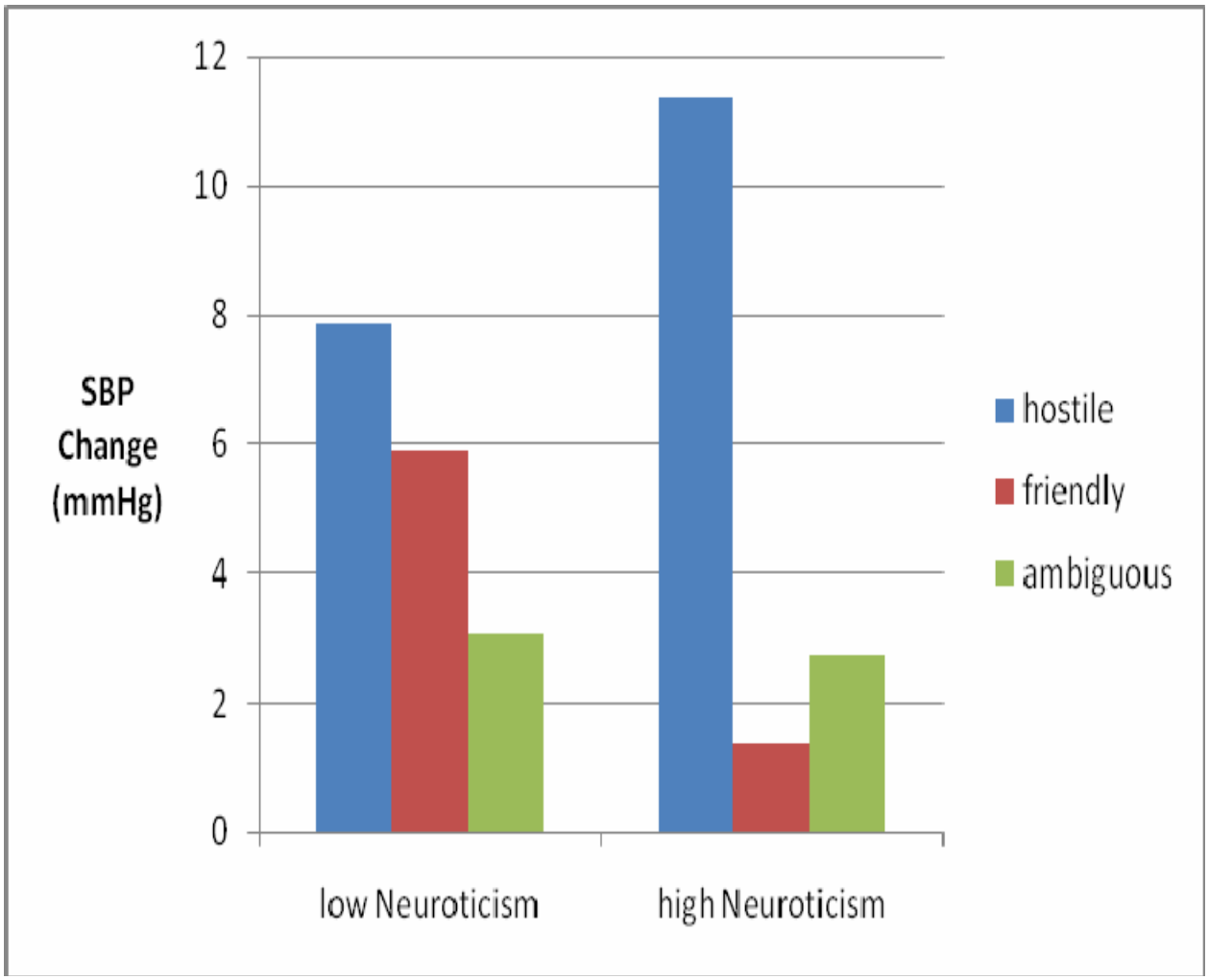

Figure 8a. Interaction between Neuroticism and Condition on Change in SBP from Baseline to Recovery

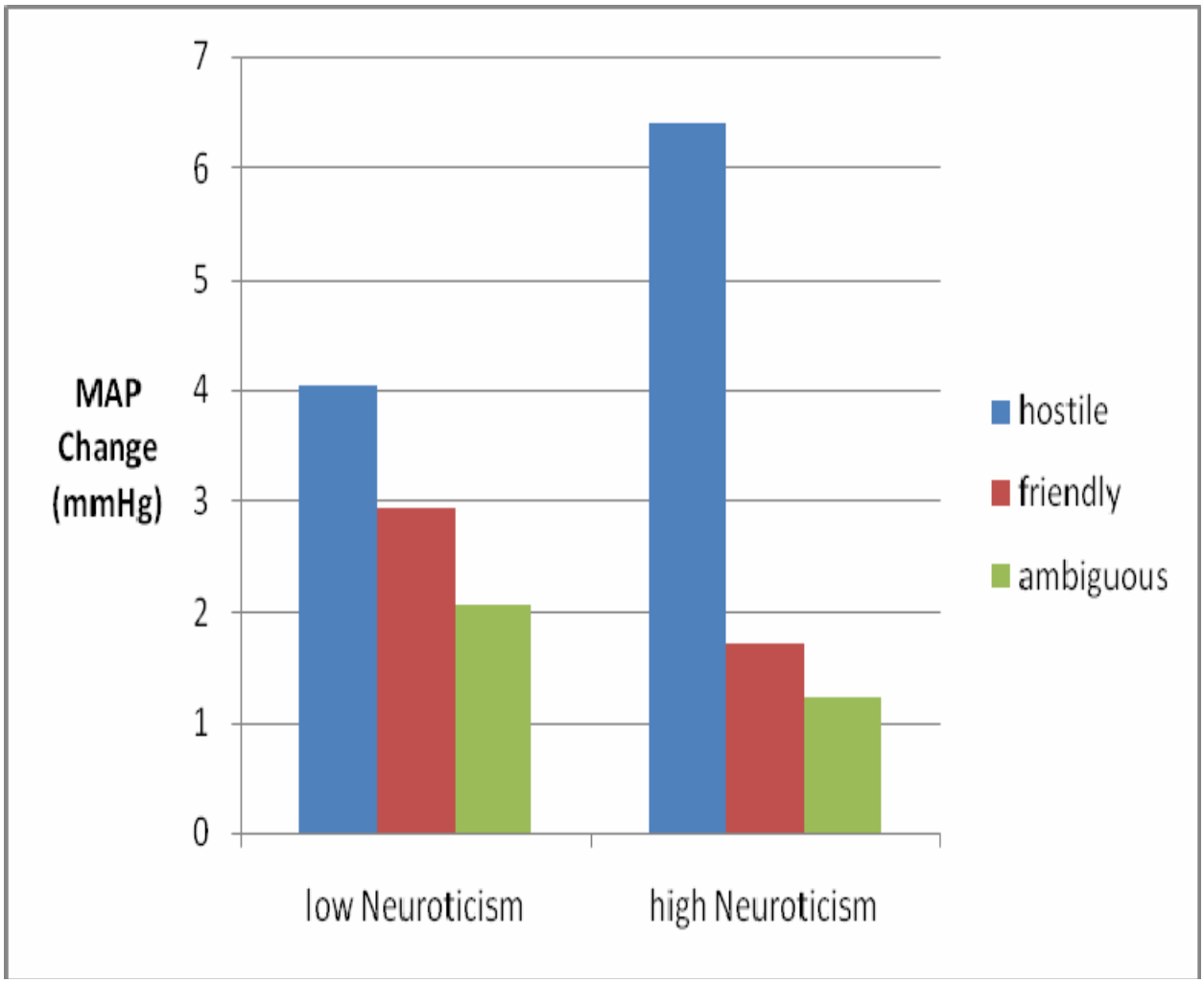

Figure 8b. Interaction between Neuroticism and Condition on Change in MAP from Baseline to Recovery