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Rationality and illusions of health.

Paul Norris
University of Massachusetts Amherst

RATIONALITY AND ILLUSIONS OF HEALTH

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by

PAUL NORRIS

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Approved as to style and content by:

Seymour Epstein, Chair

Susan T. Fiske, Member

Icek Ajzen, Member

Melinda A. Novak, Department Head
Department of Psychology

ABSTRACT

RATIONALITY AND ILLUSIONS OF HEALTH

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PAUL NORRIS, B.F.A., RHODE ISLAND SCHOOL OF DESIGN

B. ARCH., RHODE ISLAND SCHOOL OF DESIGN

M.S., UNIVERSITY OF MASSACHUSETTS AMHERST

Directed by: Professor Seymour Epstein

People use two different modes of thinking: rational or analytic, and experiential or heuristic. Individuals who describe themselves as highly rational report low levels of psychological dysfunction. But some highly rational individuals may be classifiable as repressors, denying a high level of psychological distress because they regard it as socially undesirable. It was hypothesized that highly rational individuals who are low in experientiality will typically demonstrate heightened reactivity to stress in the absence of self-reported psychological distress, while highly rational individuals who are also high in experientiality will not. 42 male and 34 female college students replied to standard self-report inventories and underwent mildly psychologically stressful tasks. Heart rate and blood pressure were measured before and after the stressor. Analysis of physiological measures and mood-adjective checklists revealed significant differences between the high rational/high experiential group and the overall mean for all subjects, though in the direction opposite to that hypothesized. Although the hypothesis had not been supported, there was evidence that high levels of rationality may be associated with illusory mental health.

TABLE OF CONTENTS

LIST OF TABLES

Table

Page

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

People commonly distinguish between logical analysis and intuitive leaps, between coldly rational thought and a more fallible, emotionally-tinged or rule-of-thumb decision-making. Especially in the realm of science, one extreme is often valued as reliable and discriminating, while the other is seen as a source of error.

In social psychology, dual-process models differentiate between intentional, deliberative information processing, and a more automatic, habitual mode (Chaiken, 1980; Petty & Cacioppo, 1986; Schneider & Shiffrin, 1977). In these models, there is a rough equivalence between intentionality, rationality, and accuracy of processing. On the other hand, the automatic mode is used when the task lacks sufficient importance, or the individual lacks the cognitive resources, to employ the more intentional mode. Thus it is regarded by these theories as less accurate and therefore less dependable than the intentional: an inferior substitute for true rationality.

Epstein's cognitive-experiential self-theory (CEST; Epstein, 1973, 1990; Epstein, Pacini, Denes-Raj, & Heier, 1994) differentiates between rational and experiential processing. The former is linear, intentional, and analytic, the latter emotionally-influenced, holistic, and intuitive. However, unlike other dual-process models, CEST specifically describes the experiential system as adaptive in its own right, not less than the rational system. Learning from and utilizing one's experience, independently of conscious awareness, was the decision-making system used over the greater part of humanity's evolutionary history. Even today, it is perfectly adequate for

common processing tasks. This view is shared by theorists of the cognitive unconscious, who see the bulk of information processing occurring automatically, and more efficiently than by means of deliberative processing (Greenwald, 1992; Kihlstrom, 1987; Reber, 1989).

Experientiality can be more effective than rationality. Most interpersonal interactions and projections of future outcomes involve a host of mutually interdependent variables: it is prohibitively cognitively-intensive to attempt to specify all of these variable with a high degree of accuracy (see Hill, 1988). In these situations, a `feeling' can be more useful than a fact.

Investigation of the relative utilization of the two systems tends to focus on the degree to which individuals are motivated to use the more effortful, rational system (e.g., Cacioppo, Petty, Kao, & Rodriguez, 1986). The assumption is apparently made that, as the experiential is the default system, it is equally available to all. It is possible that this system is capable of refinement, improvement, or development. Such human attributes as common sense and wisdom do not depend solely on conscious analytical reasoning; and they are recognized as present to a greater or lesser degree, changing over time.

Interaction of the Two Systems

What is the relationship between the experiential and the rational systems? Previous research (Norris & Epstein, 1996) suggests that the two systems are independent of each other. Using the Rational/Experiential Inventory (Epstein, Norris, & Pacini, 1995), a self-report measure of ability and valuation for the two modes,

subjects' rationality and experientiality scores were found to be effectively independent. Thus, individuals can be more or less rational and more or less experiential: that is, they can be high in one and not the other, high in both, or low in both.

The hypothesis of the above research was that individuals who are capable of high levels of both types of processing will be more psychologically healthy than those who are limited to a single mode. The ability to integrate the two systems should expand the ability to resolve conflicts and difficulties (see Labouvie-Vief, 1990). Thus, individuals able to respond flexibly to life's demands should be characterized by a relatively balanced ability to use both systems, while those limited to one system should be more subject to psychological distress.

This hypothesis was not completely supported in the previous research (Norris & Epstein, 1996). Using a 2 (rationality) X 2 (experientiality) analysis of variance design to analyze self-report measures of psychological adjustment, two groups were clearly differentiated from all others. The first, the group composed of individuals low in rationality and high in experientiality, had significantly higher levels of psychological dysfunction; the second, the group high in rationality but low in experientiality, showed a significant absence of psychological distress. Investigation of main effects showed that rationality was overall a positive attribute, strongly associated with lower levels of distress. Rationality is evidently a characteristic of mental health, and the inability to be rational, coupled with a strong experiential bent, is a predictor of distress.

However, although rationality was shown to be an adaptive attribute, experientiality was not necessarily maladaptive. Individuals high in both rationality and

experientiality were not significantly more distressed than those high in rationality and low in experientiality; on several measures of positive adjustment, they had scores indicative of significantly higher levels of functioning than the mean of the other three groups. Thus, although rationality is apparently sufficient to guarantee freedom from dysfunction, experientiality has a moderating effect: in conjunction with rationality, it is conducive to positive functioning.

Why is a high level of experientiality associated with lower levels of psychological distress for those high in rationality, but with higher levels for those low in rationality? One possibility is that both systems are necessary, but the absence of a strong experiential aptitude has consequences that can be ignored or suppressed by the individual. Thus, individuals low in experientiality and high in rationality may not be immune to psychological distress, but are either unaware of their level of distress or unwilling to acknowledge it. If this group does show higher levels of denial, and if individuals high in both rationality and experientiality do not show high levels of denial, the difference could be attributed to experientiality. Like rationality, then, experientiality would provide benefits to the individual, and its absence would be reflected in higher levels of dysfunction. Is there evidence that individuals high in rationality and low in experientiality are also characterized by denial of psychological distress?

Illusory Mental Health

A distinction can be made, for individuals reporting low levels of anxiety, between those who also report low levels of defensiveness or social desirability, and

those who report high levels of defensiveness (Weinberger, Schwartz, & Davidson, 1979). The former are regarded as truly low in anxiety, while the latter are regarded as repressors, "traditionally defined as persons manifesting heightened recognition thresholds for anxiety-provoking stimuli, [who] consistently avoid disturbing cognitions across a variety of perceptual, projective, and learning tasks" (p. 369). Although repressors report low levels of anxiety, they show evidence of high levels of stress, as assessed by physiological and behavioral measures of reactivity to psychologically stressful tasks.

More recently, Shedler, Mayman, and Manis (1993) have illustrated the inability of standard self-report measures to distinguish those truly low in neuroticism from those characterized by what they call illusory mental health. Their distinction is similar to that of Weinberger et al. (1979): of those reporting low levels of neuroticism, "one subgroup is psychologically healthy. A second subgroup is made up of people who are psychologically distressed, who maintain an illusion of mental health through defensive denial of psychological distress" (p. 1117; emphasis in original). This latter group was found to show higher levels of reactivity to stress, using both physiological and behavioral measures. In contrast to the use by Weinberger et al. of self-report measures as independent variables, however, the two groups were differentiated by discrepancy versus agreement between self-report measures of psychological distress and objective evaluations of the individual. This enabled researchers to avoid the potential confound of relying on a self-report measure of defensiveness, which may fail to measure

defensiveness and instead measure oversocialization and inhibition (Shedler et al., 1993; Weinberger, 1990).

It is important to note that in both studies, repressors or defensive deniers had higher levels of reactivity to psychological stress than individuals who reported high levels of neuroticism and anxiety. At the same time, in Weinberger et al. (1979), the repressors reported high levels of defensiveness, but lower levels of trait anxiety than the low-anxious group. Thus, in a previous study (Norris & Epstein, 1994), the status of the low rationality/high experientiality group as the most psychologically disturbed may be due neither to the negative consequences of high experientiality, nor to the absence of rationality's beneficial effects, but to that group's willingness to acknowledge psychological distress; distress which may actually be shared, or exceeded, by repressors.

In order to understand the interaction of rationality and experientiality, and its consequences for psychological functioning, it is necessary to determine whether any of those groups under consideration may be largely composed of repressors, and differ from other groups in this respect.

Overview of Present Study

The independent variables in the present study were the previously used self-report measures of rationality and experientiality (Norris & Epstein, 1994). In addition, to control for the effect of social desirability and in order to replicate Weinberger et al.'s (1979) independent variable of repression, a self-report measure of defensive social desirability was used in selecting subjects.

Subjects responded to self-report measures of anxiety, self-deception, and an inventory of medical conditions and symptoms. Subjects were then subjected to mild psychological stress, induced using Thematic Apperception Test cards and a phrase response task. Latencies to the phrase response task, measures of blood pressure and heart rate, as well as subjects' responses to a mood-adjective checklist, were taken over the course of the experiment. The crux of the study was the assessment of illusory mental health, the discrepancy between self-reported adjustment and physiological measures of stress. This study is thus an adaptation of Weinberger et al. (1979) and Shedler et al. (1993). Note, however, that in both of these studies, illusory mental health or defensive denial was used as an independent, rather than dependent, variable.

CHAPTER 2

METHODS

Subjects

Subjects were 76 University of Massachusetts students, 42 men and 34 women, who were compensated for participation with credits towards course requirements. Subjects were selected from a pool of respondents to a pre-screening questionnaire, administered as a course requirement for introductory psychology, statistics and methods courses.

Subjects were randomly selected from the cells of a two-by-two matrix, constructed from the upper and lower quartiles of rationality and experientiality, using separate means for men and women, as their distributions differ on both measures (see Materials section for descriptions). In addition, each cell was subdivided by a median split on social desirability (using the values for men and women for the entire sample of respondents), in order to ensure approximately equal representation of high and low values of this variable.

Materials

Subjects were selected using the Rational Versus Experiential Inventory (Epstein, Norris, & Pacini, 1995), a 20-item self-report instrument using a Likert-type scale of agreement or disagreement. Sample items for rationality are "I have a logical mind" (rational ability) and "I enjoy intellectual challenges" (rational favorability); for experientiality, "I trust my initial feelings about people" (experiential ability) and "I tend to use my heart as a guide for my actions" (experiential favorability). Defensive

social desirability was measured using the Defensiveness subscale of Epstein's Ego Strength Scale (adapted in part from the Marlowe-Crowne Social Desirability Scale).

Physiological measurements of systolic blood pressure, diastolic blood pressure, and pulse rate were made by finger plethysmograph at specified intervals throughout the study. At each of these times, three different readings were taken by finger plethysmograph, to compensate for inaccuracies in the admittedly low-tech equipment. The median reading was used for all analyses; analyses using the initial readings were not significantly different.

Following each physiological measurement, subjects responded to a seven-item mood-adjective checklist. Seven emotional states were characterized by a set of three adjectives each, and subjects indicated the extent to which their emotional state could be described by each set of adjectives. The seven emotional states were alert, tense, tired, irritated, calm, anxious, and jittery.

The short form of the Taylor Manifest Anxiety scale (Bendig, 1956) served as a self-report measure of psychological distress. In addition, subjects' responses to the Beck Depression Inventory, administered on the pre-screening questionnaire, were available as a supplementary dependent variable. Subjects also responded to a 35-item inventory concerning medical symptoms and problems, and a 19-item abridged version of the Self-Deception Scale (Sackeim & Gur, 1979).

Procedure

Prospective subjects were selected from the subject pool based on their scores on the REI and defensive social desirability scale. They were contacted by telephone and

invited to participate in the study. All subjects were run individually, by one of three female research assistants, in a laboratory containing only a table, two chairs, and the experimental materials.

Self-report Measure

At the beginning of the session, subjects were told that they would be answering questionnaires, writing some stories, and responding to spoken phrases, and that their blood pressure would be taken at various points. After signing a consent form and filling out a credit opscan sheet, they were asked to wash their hands. They were then told, "Now, before we continue, I want you to relax a bit. Just sit back comfortably in your chair." They were told to close their eyes and breathe quietly for a couple of minutes. At the end of two minutes, subjects' heart rate and blood pressure were recorded three times, using the finger plethysmograph. Following this, subjects responded to the seven-item mood-adjective checklist. They were then given the short form of the Taylor Manifest Anxiety Scale, the medical inventory, and the Self-Deception Scale. After responding to the measures, heart rate and blood pressure readings were taken again, and subjects responded to the mood-adjective scale.

Psychologically Stressful Tasks

Following the self-report measures, TAT and phrase association tasks were administered. The TAT response task, which was expected to be less psychologically stressful, was given first. It was introduced as follows:

> I am going to show you a series of pictures, and I want you to make up a story about each one. Tell me what is happening in the picture, what led up to it, and what the outcome will be. Also describe what the characters are thinking and

feeling. [This and the following instruction were adapted from Shedler et al., 1993.]

Subjects were then shown three TAT cards, one at a time. Each one was turned over and held upright for three minutes, during which time subjects wrote their stories in a booklet provided for the purpose. The first card (card 3BM) shows a woman, huddled on the end of a couch, with what might be a gun lying on the floor next to her. The second (card 18GF) shows an older woman holding a younger woman, with her back to the viewer; the older woman's expression is strange, and her grip on the younger woman is stiff. The third (card 13MF) shows a man standing next to a bed, in which lies a naked woman, apparently asleep but possibly dead; the man is fully clothed, and stands with his arm over his eyes, in a dramatic pose. After the card was shown for three minutes, the next card was turned over and the research assistant said, "Okay, stop writing and turn to the next page."

Following the TAT response task, the research assistant introduced the phrase association task as follows:

> For this next part I'm going to play a tape of some sentences to you. After each sentence, I want you to say the first thing that comes to mind, as quickly as possible. Give me a complete sentence or idea, not just a word. Anything you say as a response is fine, there are no right or wrong answers. Just say the first phrase that comes to mind. Please speak loudly and clearly, and try to relax between sentences.

The research assistant then started a tape recorder on which thirteen phrases were recorded. Each phrase was followed by a thirty-second period of silence, during which the subject was to respond to the phrase. The first three phrases were neutral in content, e.g., "The dairy farm bought cows." The next four phrases were based on

themes of dependency, balanced between male and female givers and receivers: "His mother had to support him" and "She pleaded with her father" are examples. The next three phrases were aggressive in content, e.g., "The stepmother brutally beat the child." The last three phrases were sexual in content, e.g., "His girlfriend is very promiscuous." Subjects' responses were recorded on a second tape recorder. Following the subject's last response, the research assistant took their blood pressure and heart rate, and subjects responded to the mood-adjective checklist.

Relaxation 1

The research assistant then debriefed the subject, as follows:

> One of the things this experiment is about is learning how people react to anxiety. The cards you were shown, and the sentences you responded to, were designed to be a little unsettling, in order to get spontaneous responses. So if you feel at all embarrassed about anything you said or wrote, remember that's normal. In fact, being able to express embarrassing thoughts may actually mean you're well-adjusted. That's one of the things this study is investigating.

Subjects were then told to sit back and relax with their eyes closed, for two minutes. Following this, their blood pressure and heart rate were again taken, and they responded to the mood-adjective checklist.

Relaxation 2

Finally, subjects were told that experimenters wanted to get a measurement of blood pressure under conditions of maximum relaxation. They were told to sit back and close their eyes, and the research assistant started a tape recorder with a guided imagery relaxation instructions. The tape told them to picture themselves on a beach, to smell the air and hear the waves, and to relax the muscles in specific parts of their neck, face, shoulders and arms. The instructions took approximately one minute; for another two

minutes, subjects sat with their eyes closed, listening to the tape recording play sounds of surf on a beach. At the end of three minutes in all, the tape recording told subjects to stretch slowly, take a deep breath, and open their eyes. The research assistant then took their blood pressure and heart rate, and they responded to the mood-adjective checklist.

Dependent Variables

Illusory mental health, the discrepancy between actual and self-reported psychological distress, was operationalized as the physiological measure of stress or reactivity minus the corresponding self-report of anxiety. This defines physiological arousal as evidence of anxiety, and assumes that self-report of anxiety or tension assesses an equivalent phenomenon.

Subjects responded to two different measures of anxiety. One was the Taylor Manifest Anxiety Scale, a measure of trait anxiety, and the other was the mood-adjective checklist administered following each measurement of blood pressure and heart rate. Because both repeated-measures and between-subjects measures of anxiety were available, discrepancy scores were calculated using each type of variable.

The repeated-measures discrepancy variable was calculated for each of the five measurement times, using the self-reported mood-adjective ratings. Of the seven adjective sets included in the mood-adjective checklist, five are descriptive of states of arousal or reactivity: "tense, stressed, or on edge", "worried, anxious, or nervous", "irritated, annoyed, or angry", "jittery, shaky, or unsettled"; the fifth triad describes the opposite state, "calm, relaxed, or at ease". Factor analysis for each of the measurement times grouped these five sets in one factor, distinct from a factor composed of the other

two sets ("alert, alive, or enthusiastic" and "tired, weary, or unreactive"). Internal-consistency reliability analyses showed acceptable internal coherence for the composite anxiety measure (for the five measurement times, all mean inter-item correlations $\geq .50$, all item-total correlations $> .35$, all alphas $> .80$). For this measure, the triads that include the adjectives "anxious" or "tense" loaded most highly, and the triads that include the adjectives "calm" (reversed) or "angry" loaded least highly. The low loadings for the reversed "calm" triad were unexpected. Possibly the loadings are affected by the reversed direction.

To calculate the repeated-measure discrepancy variable, the two measures must both be adjusted to comparable metrics. For this purpose, range-corrected scores were calculated for both the physiological and self-report measures. Range-corrected scores are a form of ipsatization. They represent each measurement as a proportion of the range of scores for each subject, by expressing it as the difference between the specific score and the subject's minimum score in the five periods, divided by the subject's overall range, as follows: (specific score - minimum score)/(maximum score - minimum score). The repeated-measures discrepancy variables were then computed as the range-corrected physiological measure (systolic blood pressure, diastolic blood pressure, or heart rate) minus the range-corrected composite anxiety measure. High scores thus represent high physiological reactivity relative to self-reported anxiety or tension, an indication of illusory mental health.

The between-subjects discrepancy measures were calculated as the difference between subjects' self-ratings of general anxiety and their over-all measures of

physiological reactivity, for each of the three physiological indices. For this purpose, the five measurements for each type of physiological measurement were averaged. In order to adjust the physiological and self-report measures to comparable metrics, each was standardized. The between-subjects discrepancy variables were then computed as the standardized average physiological measure minus the standardized trait anxiety measure. Again, high score represented illusory mental health.

Two sets of between-subjects discrepancy measures were calculated, using two measures of over-all anxiety. The first used the Taylor Manifest Anxiety Scale, a measure of trait anxiety. The second used the composite anxiety measure. For this variable, the five composite anxiety scores were averaged. The averaged score was standardized and subtracted from the standardized average physiological measure. This variable is effectively a reformulation of the repeated-measures discrepancy variable, in a between-subjects format, using standardized as opposed to range-corrected scores.

CHAPTER 3

RESULTS

For both the repeated-measures and between-subjects discrepancy variables, their component physiological and self-report variables were analyzed for group differences. All between-subjects variables were analyzed using a 2 (rationality, high vs. low) X 2 (experientiality, high vs. low) X 2 (gender of subject) analysis of variance design. All repeated-measures variables were analyzed using a 2 (rationality, high vs. low) X 2 (experientiality, high vs. low) X 2 (gender of subject) X 5 (trials) design, except as noted. Planned contrasts were also performed, comparing the mean for the high rationality/low experientiality group to the overall mean for the other three groups, and the mean for the high rationality/high experientiality group to the overall mean for the other three groups.

Repeated-measures Discrepancy Measures

Discrepancy scores were calculated for each of the five measurement periods, by subtracting the range-corrected composite anxiety measure from each of the three range-corrected physiological measures (systolic blood pressure, diastolic blood pressure, and heart rate).

Repeated-measures Physiological Measurements

Preliminary analysis of physiological measurements for all subjects indicated that the manipulations had not worked as anticipated (see Figure 1). The expected pattern would have begun with fairly low readings of blood pressure and heart rate, representing baseline measurements. The second readings, after answering

questionnaires, would have been slightly higher; the third, following the stress tasks, much higher; the fourth, following debriefing and a short recovery period, would have been lower (comparable to the second or first). The final reading, following the relaxation period with guided imagery, would have shown a modest decrease from the recovery period reading, as it would include a floor effect, subjects who did not relax beyond the recovery period relaxation. However, repeated-measures analysis of the raw measurements showed no effect for trials for any of the indices (all $\underline{F}$s < 2.0 on 4, 284 df, all $\underline{p}$s > .10). The first and last measurement periods were evidently anomalous. A stress effect was found for the middle three periods (before the stress task, after the stress task, and after the recovery period) for all three physiological measures (all $\underline{F}$s > 2.00 on 2, 144 df, all $\underline{p}$s <.10). The heart-rate deceleration for the post-stress period may have reflected subjects' increased attention to the stress tasks.

An additional complication was the low correlation of the three physiological indices with each other. The average correlation of systolic blood pressure with diastolic, across the five trials, was quite high (average $\underline{r}$ = .83, $\underline{p}$ <.010). Systolic blood pressure and heart rate, however, were not significantly correlated (average $\underline{r}$ = .04, ns). Diastolic blood pressure and heart rate were only moderately correlated (average $\underline{r}$ = .28, $\underline{p}$ <.010).

Analysis of range-corrected systolic blood pressure over the five trials showed no significant main effects or interactions for rationality, experientiality, or gender, either between or within subjects. Range-corrected heart rate showed a significant experientiality by trials interaction, $\underline{F}$ (4,272) = 3.46, $\underline{p}$ <.010, due to the high heart rates

for low-experiential subjects at the final, relaxation period, while high-experiential subjects had their highest rate at the first, baseline measurement period.

Between-subjects effects were found for both systolic blood pressure and heart rate. Heart rate showed a significant between-subjects rationality by experientiality interaction, $\underline{F}$ (1,68) = 4.81, $\underline{p}$ <.04, with the high rational/high experiential group and the low rational/low experiential group showing higher average heart rates than the other two groups. For systolic blood pressure, there was a significant between-subjects contrast of the high rationality/high experientiality group to the mean for the other three groups, $\underline{F}$ (1,71) = 5.89, $\underline{p}$ <.02, with that group's average blood pressure higher than the others'.

Most relevant to the results of the discrepancy measure (described below), range-corrected diastolic blood pressure showed a significant rationality by experientiality by gender by trials interaction, $\underline{F}$ (4,268) = 4.97, $\underline{p}$ <.001 (see Figure 2). This interaction is significant or nearly significant both for men, $\underline{F}$ (4,152) = 2.80, $\underline{p}$ <.03, and for women, $\underline{F}$ (4,116) = 2.34, $\underline{p}$ =.059. There were no significant main effects or contrasts, either for men or women or for both.

Analysis of the pattern of measurements for men, using means comparisons at each of the five measurement periods, shows significant differences for the first two periods (the baseline and the pre-stress periods). For the baseline period, there is a significant difference between the mean for the high rationality/high experientiality group, with the highest initial blood pressure of any group, and the high rationality/low experientiality group, with the lowest. For the pre-stress period, there is a significant

difference between the low rationality/low experientiality and each of the other three groups. Low rational/low experiential men, unlike men in the other three groups, showed an increase in blood pressure from the baseline period to the pre-stress period. Note also that high rational/high experiential men tended to show more extreme changes in blood pressure than men in the other three groups. Their initial reading was comparable to their post-stress reading, while they showed greater relaxation responses in the subsequent readings.

The analysis for women produces only one significant difference between means, in the recovery period. High rational/low experiential women have significantly lower blood pressure for this period than either low rational/low experiential or high rational/high experiential women. The two latter groups show no relaxation response from the post-stress to the recovery period. The group of high rational/low experiential women, in contrast, shows a definite relaxation response, with relatively low blood pressure in the recovery period.

Repeated-measures Composite Anxiety Variable

Analysis of the range-corrected composite anxiety measure produced no significant effects, interactions, or contrasts. (See Figure 3.) Note, however, that subjects reported feeling most anxious at the beginning of the experiment. As the experiment continued, their ratings of anxiety declined, increasing slightly at the post-stress measurement period, and ending with a low rating.

Repeated-measures Discrepancy Scores

Most subjects showed a tendency to give high estimates of anxiety, relative to blood pressure readings, for the first two measurement periods. By the last two measurement periods, their ratings of anxiety were low relative to their blood pressure.

Analysis of the difference between range-corrected physiological measurements and the range-corrected composite anxiety measure over the five periods produced no significant effects, interactions, or contrasts for the measures using systolic blood pressure or heart rate. The measure using diastolic blood pressure showed a significant rationality by experientiality by gender by trials effect, F (4,240) = 3.73, p <.010 (see Figure 4); no contrasts were significant.

For men, there are no significant main effects, interactions, or contrasts for the repeated-measures discrepancy using diastolic blood pressure. Means comparisons at each of the five measurement periods show significant differences only for the pre-stress period, with the discrepancy score for the low rationality/high experientiality group higher than that for the low rationality/low experientiality group. The low rational/low experiential group, unlike the other groups, felt less anxious in the pre-stress period than their blood pressure would indicate. This discrepancy is evidently a result of their relatively high blood pressure during this measurement period (see Figure 2). Although their pattern of composite anxiety ratings from the beginning of the experiment to the pre-stress period followed roughly the same declining pattern as those for the other groups, their blood pressure actually rose during this interval.

For women, there is a significant within-subjects rational by experiential by trials interaction for the discrepancy measure using diastolic blood pressure, F (4,112) = 3.19, p <.02. Means comparisons at each of the five measurement periods show significant differences only for the recovery period, with the discrepancy score for the high rationality/low experientiality group significantly lower than that for the low rationality/low experientiality group. The low rational/low experiential women felt less anxious in the recovery period than their blood pressure would indicate; their relatively high blood pressure for that measurement would explain this (see Figure 2). On the other hand, their low blood pressure in the pre-stress period would explain their high discrepancy score at this time. High rational/low experiential women felt more anxious in the recovery period than their blood pressure would indicate. Their anxiety score for this period is an increase over that for the post-stress period, and their blood pressure reading a decrease.

Finally, although there were no over-all effects for the discrepancy measures using systolic blood pressure or heart rate, analysis of these measures for women produced significant rational by experiential interactions (for the measure using systolic blood pressure, F = 2.53, p <.05; for the measure using heart rate, F = 2.59, p <.05). The pattern for the measure using systolic blood pressure is almost identical to that using diastolic blood pressure, although no means comparisons are significant. The pattern for the measure using heart rate shows few evident differences between groups, and means comparisons show only higher discrepancy scores for the group of low rational/low experiential women for final two periods, the recovery and relaxation periods.

We can explain the significant repeated-measures discrepancy scores as the result of changes in blood pressure, rather than in self-ratings of anxiety. As the adjective check-list was administered in conjunction with the blood pressure readings, it is noteworthy that the two did not produce similar results. Regarding the hypothesized connection between either of the two high-rational groups and illusory mental health, the only result is negative: for women, the high rational/low experiential group showed the opposite of illusory mental health in the recovery period, over-reporting anxiety relative to blood pressure.

Between-subjects Discrepancy Measures

There are two types of between-subjects discrepancy measures, each based on a single self-report measure of anxiety and a single score for each of the three physiological indices (systolic blood pressure, diastolic blood pressure, and heart rate). The physiological measure used for both discrepancy variables is the average of the five repeated-measures physiological readings, for each of the three indices. One discrepancy measure is the difference between the standardized averaged physiological measure and a trait anxiety measure. The other uses the average of the five repeated-measures composite anxiety scores (described above). These two measures of anxiety show a moderate correlation ($r = .38$, $p < .010$). The resulting two types of discrepancy measures correlate highly with each other (rs range from .68 to .72, all $ps < .010$).

For the between-subjects discrepancy measures and their component measures, the rational by experiential by gender analysis was based on 1 and 68 degrees of freedom; contrasts were based on 1 and 72 degrees of freedom.

Averaged Physiological Measures

Analysis of the average of the five measurements of systolic blood pressure produced only a significant effect for gender, $F = 14.71$, $p < .001$: the average blood pressure for men was higher than that that for women. There were no other significant effects, interactions or contrasts, for the average of systolic blood pressure, diastolic blood pressure, or heart rate. (See Table 1).

Between-subjects Anxiety Measures

Analysis of the trait anxiety measure produced no significant effects, interactions or contrasts. Analysis of the average of the five composite anxiety variables produced a main effect for rationality, $F = 6.06$, $p < .02$, with low-rational subjects giving higher self-ratings of anxiety. There was also a significant experiential by gender interaction, $F = 4.08$, $p < .05$. Separate analysis for men showed no effects, while separate analysis for women showed a significant main effect for experientiality, $F(1,30) = 10.48$, $p < .005$, with low-experiential women reporting high levels of anxiety.

Most important for the interpretation of the discrepancy measure (described below), a significant contrast was found for the composite anxiety measure between the mean for the high rationality/high experientiality group and the mean of the other three groups, $F = 4.09$, $p < .05$ (see Table 2), with the high rational/high experiential group reporting a lower level of anxiety than the other three groups. Follow-up analyses revealed a significant contrast between the low rational/low experiential group and the other three groups, $F = 10.27$, $p < .003$, with the low rational/low experiential group reporting higher levels of anxiety than the other three groups.

Between-subjects Diserepancy Measures

Analysis of the diserepaney measures based on averaged systolic blood pressure or heart rate produeed no signifieant effects or interactions. Analysis of the measurc based on diastolic blood pressure showed a significant rational by experiential interaction, $\underline{F} = 5.73$, $\underline{p} < .02$ (see Table 1 and Figure 5). All three measures showed a signifieant contrast effeet for the eomparison of the high rationality/high experientiality group to the mean of the other thrce groups (for the mcasure based on systolic blood pressure, $\underline{F} = 4.05$, $\underline{p} < .05$; for that based on diastolic, $\underline{F} = 5.35$, $\underline{p} < .03$; for that based on heart rate, $\underline{F} = 4.13$, $\underline{p} < .05$; see Table 1). Follow-up analyses showed no significant eontrasts for any of the other three groups. Thus, the high rationality/high experientiality group had mean diserepaney seores signifieantly higher than other groups'. More than other groups, these subjeets were likely to give low ratings of their general state of anxiety relative to their average blood pressure during the experiment.

Analyses using the diserepaney variable based on the average of the five eomposite anxiety ratings produced almost the same pattern of signifieant results (see Table 2). The only change was the absenee of a rationality by experientiality interaetion for the diserepaney measure based on diastolie blood pressure. The planned eontrasts were still significant, in the same direction. Note, however, that the pattern of means for low-rational groups is different. In part, this reflects the tendency of the low rational/low experiential subjeets to report significantly higher tension and anxiety than do other groups when responding to the mood-adjeetive cheeklist, as noted above under "Between-subjects anxiety measures".

Thus, for all six of the between-subjects discrepancy measures, the high rational/high experiential group had significantly higher discrepancy scores than the other three groups. This difference in discrepancy scores was due in large part to the lower self-ratings of anxiety given by this group.

Analysis for Men and Women

As the repeated-measures discrepancy variable produced higher-order interactions which included subjects' gender, the between-subjects discrepancy measures were also analyzed separately for men and women. For men, both the rational by experiential analysis and analysis of contrasts were based on 1 and 38 degrees of freedom; for women, both analyses were based on 1 and 30 degrees of freedom.

Analyses of the discrepancy measures for men revealed no significant effects, interactions, or contrasts. However, for the two discrepancy measures based on diastolic blood pressure, the contrast between the high rational/high experiential group and the mean of the other three groups approached significance (for the measure using trait anxiety, $F = 3.98$, $p = .053$; for the measure using the averaged composite anxiety measure, $F = 3.88$, $p = .056$; see Table 3). The discrepancy scores based on systolic blood pressure showed trends in the same direction (both Fs >3.00, both ps $<.08$). As with the corresponding contrast effects for both men and women, the mean discrepancy score for the high rational/high experiential group was higher than that for the other three groups, representing a tendency to give low estimates of anxiety relative to blood pressure during the experiment.

Investigating the components of the discrepancy measures for men, analysis of average systolic and diastolic blood pressure showed no significant effects or interactions. However, significant contrasts were found between the high rational/high experiential group and the mean of the other three groups (both $\underline{F}$s > 4.00, both $\underline{p}$s <.05; see Table 3), with that group recording the highest average range-corrected blood pressure. No significant effects, interactions, or contrasts were found for men for the trait anxiety measure. The higher scores for this group on the discrepancy measure based on trait anxiety were thus not a result of lower anxiety, but of their higher blood pressure during the experiment. Analysis of the averaged composite anxiety measure for men produced a significant effect for rationality, $\underline{F} = 4.60$, $\underline{p} < .04$, with high-rational men giving a lower average rating of anxiety than low-rational men. This would contribute to the higher scores for high rational/high experiential men on the discrepancy measure using averaged composite anxiety.

Thus, high rational/high experiential men tended to have higher discrepancy scores on the four between-subjects discrepancy measures using systolic or diastolic blood pressure. These scores were a result of higher blood pressure, combined with lower ratings by high-rational men on one of the self-report measures of anxiety.

Analyses of the discrepancy measures for women produced a significant rational by experiential interaction for the discrepancy measure based on diastolic blood pressure and trait anxiety score, $\underline{F} = 4.28$, $\underline{p} < .05$ (see Table 4). No contrasts were significant. For the interaction, the high rational/high experiential group is one of the two groups high in discrepancy, although not higher than the group of low rational/low

experiential women. The other high-rational group, the high rational/low experiential group, is one of the two groups low in discrepancy. The discrepancy measure using systolic blood pressure shows a rational by experiential trend, $F = 3.37$, $p < .08$, with the same pattern of means.

All three discrepancy measures using the averaged composite anxiety score showed significant main effects for experientiality (Fs range from 4.61, for the measure using diastolic blood pressure, to 7.97, for the measure using heart rate; all ps <.05). For all three experiential effects, the low experiential group showed a negative discrepancy score, ranging from -1.04 to -.67, while the high experiential group showed discrepancy scores ranging from near zero (-.07 for the measure using systolic blood pressure) to .79 (for the measure using heart rate). Thus, low-experiential women tended to give high estimates of tension and anxiety on the mood-adjective checklist, relative to their blood pressure and heart rate. High-experiential women gave low estimates of anxiety relative to heart rate, but roughly comparable estimates relative to blood pressure. Finally, a significant contrast was found for women for the discrepancy between heart rate and averaged composite anxiety score, with the group high in both rationality and experientiality giving low estimates of their anxiety relative to their heart rate, $F = 4.22$, $p < .05$ (see Table 4). The discrepancy measure based on heart rate and trait anxiety shows a trend for the same contrast, $F = 3.04$, $p < .10$.

Investigating the components of the discrepancy measures for women, no significant effects, interactions, or contrasts were found for any of the three averaged physiological measures, or for the trait anxiety measure. Thus, the significant

discrepancy effect for the measure based on diastolic blood pressure and trait anxiety score is not explainable in terms of its component measures. Analysis of the averaged composite anxiety score revealed no significant effects or interactions, but a significant contrast was found between the group high in both rationality and experientiality and the mean of the other three groups, $F = 5.97$, $p < .03$ (see Table 4). This group gave lower ratings of anxiety over the course of the experiment than the other three groups, which would result in higher discrepancy scores on the measure using composite anxiety score and heart rate, noted above.

For the averaged composite anxiety measure, a significant effect for experientiality was also found, $F = 10.48$, $p < .004$, with low-experiential women giving higher average ratings of anxiety than high-experiential women. This would contribute to the main effects for experientiality for the discrepancy measures using the composite anxiety scores, noted above, as well as to the contrast for the high rational/high experiential group.

Thus, women high in both rationality and experientiality tended to have higher discrepancy scores than other women, for both between-subjects discrepancy measures based on heart rate. For discrepancy scores based on trait anxiety and blood pressure, the same group of women tends to have higher discrepancy scores than two other groups, one of which is the group of high rational/low experiential women.

Supplementary Analyses

Analyses of the discrepancy measures and their components were also performed, using variables unrelated to the hypotheses of interest but which could possibly moderate the obtained results.

Social Desirability

Subjects had been pre-selected to represent a 2 (rationality, upper and lower quartile) X 2 (experientiality, upper and lower quartile) X 2 (gender of subject) X 2 (social desirability, median split) matrix, in order to be able to control for social desirability. For the between-subjects discrepancy measures and their components, analyses were done using this design, on 1 and 60 degrees of freedom. For the repeated-measures analyses, analysis was performed using a 2 (rationality, upper and lower quartile) X 2 (experientiality, upper and lower quartile) X 2 (gender of subject) X 2 (social desirability, median split) X 5 (trials) analysis of variance design. Degrees of freedom were as noted.

For the repeated-measures variables, analyses revealed no main effects for social desirability. Significant interactions including social desirability and rationality were found for within-subjects range-controlled systolic blood pressure measure (rationality by gender by social desirability), the repeated-measures discrepancy variable based on systolic blood pressure (rationality by experientiality by social desirability, and rationality by gender by social desirability), and the discrepancy measure based on diastolic blood pressure (rationality by experientiality by social desirability). However,

separate analyses for subjects high and low in social desirability found no significant effects or interactions for the relevant variables and combinations of variables.

For the between-subjects discrepancy measures, the averaged composite anxiety measure and the three discrepancy measures based on that measure all showed significant main effects for social desirability (for the anxiety measure, $F = 8.12$, $p < .010$; for the three discrepancy measures, all Fs > 4.00, all ps $< .04$). High social desirability subjects had negative values for the standardized composite self-rated anxiety measure, and positive discrepancy scores, representing low estimations of anxiety relative to physiological measurements. No interactions were found between social desirability and rationality, for any of the between-subjects discrepancy measures or their component measures.

Analyses by Individual Research Assistant

A variable representing the three female research assistants was created, in order to analyze the data for possible experimenter effects.

For the repeated-measures variables, analyses revealed no main effects for research assistant. Significant interactions involving rationality and the research assistant variable were found for the composite anxiety measure (rationality by experientiality by research assistant, and rationality by experientiality by research assistant by gender), the discrepancy measure based on diastolic blood pressure (rationality by experientiality by research assistant), and the discrepancy measure based on heart rate (rationality by experientiality by research assistant by gender). Separate analyses for subjects run by the three research assistants revealed only a significant

within-subjects rational by experiential interaction for one research assistant, for the composite anxiety measure. Analysis of the measure showed no important differences from the pattern for all subjects, although for the post-stress period the high rationality/high experientiality group rated their anxiety level as significantly higher than the low rationality/high experientiality group.

For the between-subjects discrepancy measures and their components, significant rationality by research assistant or rationality by gender by research assistant interactions were found for all but two of the variables. Separate analyses for each of the three research assistants revealed corresponding main effects for rationality or rational by gender interactions for all but two of these, a total of eight effects or interactions for five variables. All of these effects were for the one research assistant (not the same as in the above paragraph).

For subjects run by this research assistant, the group of high rational subjects had higher overall heart rates, $F = 13.60$, $p < .005$, lower averaged composite anxiety scores, $F = 22.56$, $p < .001$, and higher discrepancy scores for the measures using composite anxiety scores (all Fs > 10.00, all ps $< .005$). For the composite anxiety measure, the discrepancy measure based on diastolic blood pressure and composite anxiety, and the discrepancy measure based on heart rate and composite anxiety, significant rational by gender interactions were driven by the group of low rationality/low experientiality subjects, who had higher self-ratings for anxiety, and negative discrepancy scores, representing high ratings of anxiety relative to

physiological measurements (all Fs > 9.00, all ps <.010; all contrasts significant, all Fs >11.00, all ps <.005).

None of these results conflicts with results obtained for the sample as a whole. They will not be discussed further.

Analysis of Predictor Variables

Regression analysis was performed on the discrepancy measures and their component measures, to examine the possible relationships between illusory mental health and the variables available for study. Social desirability, self-deception, rationality, experientiality, and the rational and experiential derogation scales were entered as predictor variables.

No significant predictors were found for the averaged physiological measures. For both between-subjects measures of anxiety, rationality and self-deception were negative predictors, explaining more than twenty-five percent of the variance. These two variables were also positive predictors of the two discrepancy measures based on heart rate, accounting for thirteen percent of the variance on the two measures. Self-deception by itself was a positive predictor of the discrepancy measures based on blood pressure, accounting for seven or eight percent of the variance for the four measures. Social desirability was also a positive predictor of three of the six discrepancy measures, although separately from rationality and self-deception.

Thus, there is a relationship between self-deception and illusory mental health, and both are associated with higher rationality scores.

As a preliminary investigation, subjects' responses from the phrase-response task were coded for latency. Latencies were analyzed both excluding absence of response from the analysis, and assigning absences an arbitrary latency equal to the shortest time between phrases (11.60 seconds). Silences were also analyzed. As only one coder was available, inter-coder reliability was not achievable, and results must be regarded as tentative.

For the more conservative measure, excluding absent responses, a significant rational by gender interaction was found for responses to phrases with aggressive content, F (1,67) = 4.07, p <.05. High rational men responded to these phrases significantly more quickly than low rational men. Women showed the opposite pattern, so that high rational women responded more slowly than low rational women, although not significantly. For phrases with sexual content, a significant main effect was found for rationality, F (1,65) = 5.26, p <.03, with subjects high in rationality answering more slowly. This was accompanied by a nearly significant contrast between high rational/high experiential subjects and the mean of the other three groups, F (1,69) = 3.89, p = .053, in which this group answered more quickly than any other group. No significant effects, interactions, or contrasts were found for analysis of the phrases with dependency-related content, or for all stressful phrases. No major differences were found with the less conservative latency measure.

Analysis of silences produced only a significant contrast for dependency-related phrases, between the high rational/low experiential group and the mean of the other

three groups, F (1,71) = 5.21, p <.03, in which this group failed to respond to significantly more phrases.

These findings are difficult to reconcile, and not obviously relevant to the hypotheses under consideration.

Additional Measures

In addition to the measures relevant to testing the hypothesis of illusory mental health, several additional measures were administered during the course of the experiment. These were analyzed using the same 2 (rationality, high vs. low) X 2 (experientiality, high vs. low) X 2 (gender of subject) design as before, based on 1 and 68 degrees of freedom except as noted. This analysis was followed by planned contrasts, based on 1 and 72 degrees of freedom except as noted, comparing the mean for the high rationality/low experientiality group to the overall mean for the other three groups, and the mean for the high rationality/high experientiality group to the overall mean for the other three groups. Means for variables with significant rational by experiential interactions or significant contrasts are displayed in Table 5.

Medical Check-list

A check-list was administered, assessing the incidence of common illnesses, medical conditions, and accidents, as well as the number of visits to doctors and therapists. With one exception (the measure of total symptoms, described below), none of the multi-item variables on the checklist (emotional symptoms, psychophysical symptoms, infectious diseases, self-control issues) produced significant effects, interactions, or contrasts. Significant results were obtained for three single-item

measures and one summary measure. Items addressing whether subjects were currently receiving psychotherapy and the number of visits to therapists during the past three years could not be analyzed, as only five subjects out of 76 responded to each.

An item asking whether or not subjects were currently receiving medical treatment produced a main effect for rationality, $F = 4.65$, $p < .035$, with high-rational subjects more likely to be receiving medical treatment. This effect was driven by the high rationality/low experientiality group, as shown by the contrast of that group to the mean of the other three groups, $F = 11.50$, $p = .001$ (see Table 5). A question assessing the number of visits to doctors produced a significant interaction between rationality, experientiality, and gender, $F = 6.83$, $p < .02$ (see Table 6), although no group differed significantly from other groups in range tests.

Analysis of ratings of overall satisfaction with physical health produced a significant main effect for experientiality, $F = 6.17$, $p < .02$, with high experiential subjects reporting higher satisfaction. A significant contrast was also found between the group high in both rationality and experientiality and the mean of the other three groups, $F = 6.56$, $p < .02$, in which that group expressed the greatest satisfaction with their health. Finally, a significant interaction was found between rationality, experientiality, and gender, $F = 4.65$, $p < .04$ (see Table 6), though it is quite complex. A summary variable of total physical health also produced a three-way interaction, $F = 5.76$, $p < .02$; again, it is difficult to interpret, and range tests showed no significant differences between means.

The Sackeim and Gur Self-Deception Scale was administered during the experiment, as a potential criterion variable for physiological measures. The measure can be interpreted as having a continuous response scale, making it a measure of willingness to acknowledge common but discomforting thoughts; or as a dichotomous measure, assessing denial. Both interpretations showed a main effect for experientiality, $\underline{F}$s > 6.00 , $\underline{p}$s <.02, with high experiential subjects showing higher levels of denial than low experiential subjects. The dichotomous interpretation also showed a contrast effect, with the group high in both rationality and experientiality showing a higher score for denial than any other group, $\underline{F}$ = 4.73, $\underline{p}$ <.04 (see Table 5).

Measures Pertinent to Rationality and Experientiality

Unsurprisingly, significant main effects were found for measures of rational derogation and experiential derogation, included in the pre-screening questionnaire. For rational derogation, a main effect was found for rationality, $\underline{F}$ = 38.33, $\underline{p}$ <.001, with low rational subjects showing higher levels of rational derogation than high rationals, by a two to one ratio. More interestingly, range tests found a difference between means, such that scores for low rational/low experiential subjects were significantly higher than those for low rational/high experiential subjects, which in turn were significantly higher than those for either of the high rational groups (see Table 5). A main effect for experientiality was found for experiential derogation, $\underline{F}$ = 34.41, $\underline{p}$ <.001, with scores for low experiential subjects almost twice as high as those for high experiential subjects.

Personal Relationships

Several measures on the pre-screening questionnaire dealt with subjects' personal history. Two attachment style prototype questions, out of four, showed significant effects for experientiality, as well as significant contrasts. The fearful attachment style prototype was more likely to be endorsed as typical by low experientiality subjects, F (1,67) = 8.60, p <.010, with high rationality/high experientiality subjects less likely than the other three groups to endorse the prototype, F (1,71) = 4.45, p <.04 (see Table 5). The secure attachment style prototype showed the opposite pattern: it was more likely to be endorsed by high experientiality subjects, F (1,67) = 5.12, p <.03, and high rationality/high experientiality subjects were more likely than subjects in the other three groups to endorse it, F (1,71) = 6.61, p <.02 (see Table 5).

Finally, a measure assessing subjects' degree of worrying showed a significant main effect for experientiality, F = 8.31, p <.010, with low experientiality subjects more likely to worry. A main effect was also found for gender, F = 5.64, p <.03, with men more likely than women to worry. A significant contrast was found between the high rational/high experiential group and the mean of the other three groups, F = 6.75, p <.02 (see Table 5), with that group less likely than subjects in any of the other three groups to describe themselves as worrying.

CHAPTER 4

DISCUSSION

This study sought to provide an alternative explanation for self-reports of low levels of psychological distress by individuals who also identify themselves as highly rational. The hypothesis of the study was that these self-reports were evidence of illusory mental health, the minimization of displayed anxiety and distress. If highly rational individuals showed greater physiological reactivity to stress than did other individuals, self-reports of low psychological distress could be reinterpreted as being intentionally or unintentionally misleading.

Summary of Results

The study demonstrated patterns of discrepancies between physiological indicators and self-reported anxiety. These discrepancies were consistently associated with the group of high rational/high experiential individuals, and not with other groups.

Discrepancy measures were calculated for each of five measurement periods, as well as for the over-all discrepancy between self-reported anxiety and physiological reactivity. Analyses of the repeated-measures discrepancy variables were difficult to interpret, and did not support the study's hypothesis. For these measures, the only evidence directly bearing on the question of illusory mental health for either of the high rational groups was a relatively low discrepancy score, the opposite of illusory mental health, for the group of high rational/low experiential women in the recovery period.

For the over-all discrepancy scores, the high rational/high experiential group showed higher levels of illusory mental health than other groups did. This result held for both men and women.

Thus, some high-rational individuals did under-report anxiety relative to arousal, compared to individuals in other groups. However, the group in question consisted of individuals high in both rationality and experientiality. Individuals high in rationality but low in experientiality showed no evidence of such under-reporting. Because a secondary hypothesis of the study was that high rational/high experiential individuals would show less evidence of illusory mental health than other groups, these results are unexpected. In considering the validity of the hypothesis, and the consequences of the observed results, limitations of the study should be taken into account.

Validity of Experimental Data

The measures of discrepancy were based on differences between physiological data and self-report data. There are grounds for skepticism regarding both types of measures.

Physiological measures of heart rate and blood pressure are not necessarily accurate measures of the effect of stress. No physiological measure is unambiguous, measuring only the response to a specific stimulus, even for a single individual. Different individuals may show different physiological responses to the same stimuli. As was seen in the present study, different physiological indices do not necessarily correlate with each other, as the reactions they measure are elicited by different stimuli and follow different response patterns over time. Thus, heart rate responds more quickly

to stimuli than does blood pressure, including anticipated as well as actual physical effort. Heart rate also tends to decelerate when the individual concentrates on some stimuli. For blood pressure, systolic pressure shows a different pattern than diastolic, being more sensitive to stimulation and thus less stable than diastolic.

The instrument used to measure physiological reactivity in this study is a relatively crude machine. The low reliability of such an instrument is less problematic for heart rate, which is more easily observed than blood pressure. The fact that diastolic blood pressure gave stronger and more consistent results than did systolic may be a consequence of that measure's greater stability. The fact that significant and consistent results were obtained for measures of discrepancy based on blood pressure is noteworthy, given the low reliability of the instrument used.

The relative absence of significant effects for the self-report data is partly a consequence of the low variability of the data. Self-reports of tension or anxiety showed no significant differences between groups on the repeated-measures variable. To the extent that self-reported anxiety differed from physiological measures, but was intended to assess the same underlying construct, it can be considered to be inaccurate. Self-reported anxiety followed a consistent pattern, declining over the course of the experiment, rising in the post-stress measurement period, and dropping to its lowest point in the final recovery and relaxation periods. This was a predictable path, and therefore need not have represented accurate self-awareness or self-report. Consequently, it may have been in fact an accurate report of subjects' feelings, or their attempt to present reasonable responses. However, the high initial values, matching high

initial readings for the physiological measures, seem consistent with some subjective awareness of actual arousal.

Experimental Manipulations

The purpose of the experimental manipulations was to create a stressful situation, in which subjects' physiological responses to stress could be examined. It must be acknowledged that in most cases the actual manipulations failed to achieve their effect in an unambiguous fashion.

The relatively high readings on physiological indices for the first measurement period may represent a response to a novel and somewhat threatening situation. For most subjects this reading was comparable to the post-stress reading. Thus, the stress manipulation did not necessarily represent an increase in stress over the baseline situation. Alternatively, the relatively weak physiological response in the post-stress period could be a result of a ceiling effect: a proportionately greater stress might have been necessary to elevate the physiological indices above this point. Self-protective mechanisms may also have come into play. Subjects may have consciously or unconsciously suppressed their physiological responses to the stress tasks, for example by focussing on the content of the stimuli. The tentative explanation of heart rate deceleration in the post-stress period as a consequence of increased attentiveness would be congruent with this suppression hypothesis.

Additional Measures

Analyses of the additional measures administered in this study is illustrative of the nature of the two high-rational groups.

High rational/low experiential individuals are characterized only by being more likely to be under medical treatment. This finding seems inconsistent with self-deception and with illusory mental health. Differential tendency to seek medical treatment may indicate health problems, or simply a greater attentiveness to symptoms. The fact that this group did not show more physical symptoms than other groups, as assessed on the medical checklist, supports the latter conclusion.

This group also showed lower discrepancy scores in the recovery period, the consequence of declines in blood pressure without corresponding declines in self-reported anxiety. This is evidence of the low correlation between self-report and physiological measures. It may also reflect a conservative tendency to over-estimate anxiety relative to physical arousal, consistent with the hypothesized higher level of self-assessment concerning health issues mentioned above.

High rational/high experiential individuals, on the other hand, are characterized by having a secure and not a fearful attachment style, by engaging in neither rational nor experiential derogation, by not worrying, and by having relatively high scores on a measure of self-deception. This last finding casts the others in doubt. Perhaps their low levels of anxiety, their secure relationships, their lack of worrying, are all self-presentational. These subjects' high scores on measures of both rationality and experientiality may also be self-presentational.

The two high-rational groups differ in their self-reported level of experientiality. The assumptions made about this variable colored the study's hypotheses. This study hypothesized that experientiality would moderate rationality in the direction of positive

psychological health, evidenced by lower scores on a measure of illusory mental health. Given the results, demonstrating the opposite of the hypothesis of lower illusory mental health for the high rational/high experiential group, it is possible that a moderating tendency exists, but in the direction of illusory mental health.

Questions Regarding Assumptions

Both the independent and dependent variables used in this study may admit reinterpretation.

In considering possible moderating effects on rationality, experientiality may not be the operative variable. The measure of experientiality used in the pre-screening for this study is based on an operationalization of experiential processing as intuition. However, this does not fully capture the nature of experiential processing according to Cognitive-Experiential Self-Theory. In addition, it is possible that individuals high in experientiality do not think of themselves as especially intuitive. The intuitive ability, perhaps unlike rationality, need not be connected to any objective awareness of such ability, let alone to its incorporation into the self-image. It may not be directly assessable using self-report, and individuals reporting high levels of experientiality may not be representative of all highly experiential individuals.

One assumption made in the design of the study was that extreme scores represented a greater degree of the attribute, rather than a qualitative difference from less extreme scores. Subjects were chosen from a pool of individuals with extreme scores on measures of rational and experiential processing. Their high standing on both rationality and experientiality may also mean that these individuals are extreme in other

ways. Describing oneself as highly rational requires a certain level of self-esteem. To the degree that claiming intuitive ability likewise demonstrates a positive self-image, individuals in the high rational/high experiential group may possess a level of self-esteem unrepresentative of the general population.

The dependent measure of illusory mental health was based on physiological reactivity. It was assumed that high reactivity is a response to stress. Higher physiological reactivity may in fact represent an adaptive response to stressful situations. The issue of maladaptive responses may better be addressed by examining recovery patterns: an adaptive response may consist in high reactivity followed by rapid recovery. An attempt to do this was made, by including the final relaxation period, with guided relaxation imagery. However, as the physiological data make evident, either this manipulation did not work, and possibly backfired, or such relaxation does not affect the physiological measures used.

The dependent variable of illusory mental health may also be misunderstood. An assumption made by this study was that low self-reported anxiety in the presence of high physiological reactivity is evidence of ill health, either mental or physical, and is maladaptive. However,there may not be serious negative consequences to illusory mental health. Illusory mental health may represent denial, or it may represent bias towards positive interpretations.

The relationship between illusory mental health and self-deception demonstrated by regression analyses argues against the adaptive interpretation. Illusory mental health

is adaptive only to the degree that self-deception is adaptive. This also can be debated, but such debate cannot be addressed in this discussion.

On the other hand, if illusory mental health and self-deception entail physiological or psychological costs to the individual, decrements in performance should be obtained. The absence of latency effects for the group high in illusory mental health, high rational/high experiential individuals, argues against that understanding of self-deception.

Conclusions

This study provides evidence that individuals who are high in both rationality and experientiality are also characterized by illusory mental health. Are these attributes manifestations of an underlying variable, such as high self-esteem? or are they causally related to each other? What function does the illusion of mental health serve? Is it an element of social desirability?

We can speculate that illusory mental health may involve issues of perceived control. Rationality may represent a form of control over one's experiences, creating order in the individual's world. It is also possible that experientiality may involve an intensity of perceptions and reactions to stimuli, necessitating a relatively high degree of control in order that the individual may experience some sense of security.Evidence of higher levels of positive functioning exhibited by the high rational/high experiential group may be due to differences in subjective well-being, depressive realism, or unrealistic optimism.

Are those who show signs of illusory mental health aware of the illusion? Weinberger (1990) examined repressors, individuals with low levels of self-reported anxiety but relatively high scores on measures of social desirability. He found that they sought to limit their own awareness of their negative affect, and not merely other people's. Davis and Schwartz (1987) found that repressors had limited retention of both negative and positive affective memories, relative to high-anxious and non-defensive low-anxious individuals. If self-deception is effective in reducing perceived stress and enhancing perceived control of one's environment, need it have negative consequences?

Awareness of one's illusions, and the consequences of those illusions, is intimately connected to the study of thinking styles and processing modes. The goals of the individual must be associated with the means whereby those goals are reached and with the individual's self-image. The degree of integration of experientiality and rationality must have consequences both for self-image and life goals.

Thus, the moderating effect of experientiality on rationality is of interest not only in determining whether rationality is a positive trait in itself. The issue of the nature of rationality, and the development of human functioning, is also a question of the relative strengths of human abilities. The question of the best use of those abilities is central to the definition of the individual. Adult developmental patterns may well involve the interaction and integration of the two thinking styles (Labouvie-Vief, 1990). Wisdom may be the ability to use both the strengths of the rational system, and the strengths or weaknesses of the experiential system, to arrive at answers to questions in a real, irrational, world.

Table 1

Means for Trait Anxiety Discrepancy Measures and Component Physiological and Self-report Measures

	low R/ low E	high R/ low E	low R/ high E	high R/ high E
N	14	17	20	25
Systolic blood pressure	0.05_{a}	-0.31_{a}	0.04_{a}	0.15_{a}
Diastolic blood pressure	0.17_{a}	-0.37_{a}	-0.08_{a}	0.22_{a}
Heart rate	-0.09_{a}	-0.10_{a}	-0.07_{a}	0.18_{a}
Trait anxiety score	0.02_{ab}	-0.03_{ab}	0.40_{b}	-0.31_{a}
Systolic minus trait anxiety	0.03_{a}	-0.28_{a}	-0.36_{a}	0.46_{a}
Diastolic minus trait anxiety	0.15_{ab}	-0.34_{ab}	-0.48_{a}	0.53_{b}
Heart rate minus trait anxiety	-0.11_{ab}	-0.07_{ab}	-0.47_{a}	0.49_{b}

Note. All component variables standardized. "R": rationality; "E": experientiality; "Systolic": systolic blood pressure; "Diastolic": diastolic blood pressure; "Trait anxiety score": Taylor Manifest Anxiety score.
Means not sharing the same subscript differ significantly, $p < .05$.

Table 2

Means for Averaged State Anxiety Discrepancy Measures and Component Physiological and Self-report Measures

	low R/ low E	high R/ low E	low R/ high E	high R/ high E
N	14	17	20	25
Systolic blood pressure	0.05_{a}	-0.31_{a}	0.04_{a}	0.15_{a}
Diastolic blood pressure	0.17_{a}	-0.37_{a}	-0.08_{a}	0.22_{a}
Heart rate	-0.09_{a}	-0.10_{a}	-0.07_{a}	0.18_{a}
Averaged state anxiety score	0.74_{b}	-0.18_{a}	-0.01_{a}	-0.29_{a}
Systolic minus state anxiety	-0.69_{a}	-0.14_{ab}	0.06_{ab}	0.44_{b}
Diastolic minus state anxiety	-0.58_{a}	-0.19_{ab}	-0.07_{ab}	0.50_{b}
Heart rate minus state anxiety	-0.83_{a}	0.07_{ab}	-0.06_{ab}	0.46_{b}

Note. All component variables standardized. "R": rationality; "E": experientiality; "Systolic": systolic blood pressure; "Diastolic": diastolic blood pressure; "State anxiety score": averaged repeated-measures composite mood-adjective anxiety score.
Means not sharing the same subscript differ significantly, $p < .05$.

Table 3

Means for Selected Discrepancy Measures and Component Physiological and Self-report Measures, for Men

	low R/ low E	high R/ low E	low R/ high E	high R/ high E
N	8	10	11	13
Diastolic blood pressure	0.21_{ab}	-0.29_{a}	-0.03_{ab}	0.65_{b}
Trait anxiety score	0.28_{a}	-0.04_{a}	0.30_{a}	-0.06_{a}
Diastolic minus trait anxiety	-0.07_{a}	-0.25_{a}	-0.33_{a}	0.71_{a}
Diastolic blood pressure	0.21_{ab}	-0.29_{a}	-0.03_{ab}	0.65_{b}
Averaged state anxiety score	0.62_{b}	-0.49_{a}	0.21_{ab}	-0.17_{ab}
Diastolic minus state anxiety	-0.41_{a}	0.19_{a}	-0.25_{a}	0.83_{a}

Note. All component variables standardized. "R": rationality; "E": experientiality; "Systolic": systolic blood pressure; "Diastolic": diastolic blood pressure; "Trait anxiety score": Taylor Manifest Anxiety score; "State anxiety score": averaged repeated-measures composite mood-adjective anxiety score.
Means not sharing the same subscript differ significantly, $p < .05$.

Table 4

Means for Selected Discrepancy Measures and Component Physiological and Self-report Measures, for Women

	low R/ low E	high R/ low E	low R/ high E	high R/ high E
N	6	7	9	12
Diastolic blood pressure	0.11_{a}	-0.47_{a}	-0.14_{a}	-0.25_{a}
Trait anxiety score	-0.33_{ab}	-0.01_{ab}	0.52_{b}	-0.58_{a}
Diastolic minus trait anxiety	0.44_{a}	-0.46_{a}	-0.66_{a}	0.33_{a}
Heart rate	-0.46_{a}	0.20_{a}	0.44_{a}	0.43_{a}
Averaged state anxiety score	0.90_{b}	0.27_{ab}	-0.29_{a}	-0.41_{a}
Heart rate minus state anxiety	-1.37_{a}	-0.07_{ab}	0.73_{b}	0.84_{b}

Note. All component variables standardized. "R": rationality; "E": experientiality; "Systolic": systolic blood pressure; "Diastolic": diastolic blood pressure; "Trait anxiety score": Taylor Manifest Anxiety score; "State anxiety score": averaged repeated-measures composite mood-adjective anxiety score.
Means not sharing the same subscript differ significantly, $p < .05$.

Table 5

Means for Additional Measures

	low R/ low E	high R/ low E	low R/ high E	high R/ high E
N	14	17	20	25
Under medical treatment, yes or no	0.00_{a}	0.24_{b}	0.00_{a}	0.04_{a}
Receiving psychotherapy, yes or no	0.07_{ab}	0.18_{b}	0.05_{ab}	0.00_{a}
Therapy sessions past 3 years	1.21_{b}	1.00_{b}	0.20_{a}	0.28_{a}
How satisfied with physical health	2.29_{a}	2.53_{ab}	2.75_{ab}	3.12_{b}
Self-deception, dichotomous scale	0.48_{a}	0.53_{ab}	0.61_{ab}	0.64_{b}
Experiential derogation	2.01_{b}	1.82_{b}	1.16_{a}	0.87_{a}
Rational derogation	1.96_{c}	0.74_{a}	1.47_{b}	0.78_{a}
Fearful attachment style	5.00_{b}	3.88_{ab}	2.80_{a}	2.58_{a}
Secure attachment style	3.14_{a}	4.35_{ab}	4.55_{ab}	5.58_{b}
Worry scale	2.90_{b}	2.75_{b}	2.37_{ab}	2.03_{a}

Note. "R": rationality; "E": experientiality.
Means not sharing the same subscript differ significantly, $p < .05$.

Table 6

Means for Additional Measures by Rationality, Experientiality, and Gender

	Men:				Women:			
	low R/ low E	high R/ low E	low R/ high E	high R/ high E	low R/ low E	high R/ low E	low R/ high E	high R/ high E
N	8	10	11	13	6	7	9	12
Visit physician	2.12_{a}	1.60_{a}	1.09_{a}	1.85_{a}	1.00_{a}	1.86_{a}	2.11_{a}	1.33_{a}
Therapy	1.50_{b}	0.50_{a}	0.00_{a}	0.23_{a}	0.83_{ab}	1.71_{b}	0.44_{a}	0.33_{a}
Satisfied	2.12_{ab}	2.90_{abc}	3.00_{abc}	3.08_{bc}	2.50_{abc}	2.00_{a}	2.44_{abc}	3.17_{c}
Symptoms	12.88_{a}	11.50_{a}	11.36_{a}	13.77_{a}	8.83_{a}	17.43_{a}	15.78_{a}	11.83_{a}

Note. "R": rationality; "E": experientiality; "Visit physician": visits to physician during past year; "Therapy": number of sessions during past three years; "Satisfied": how satisfied they reported being with their physical health; "Symptoms": total physical symptoms reported.
Means not sharing the same subscript differ significantly, $p < .05$.

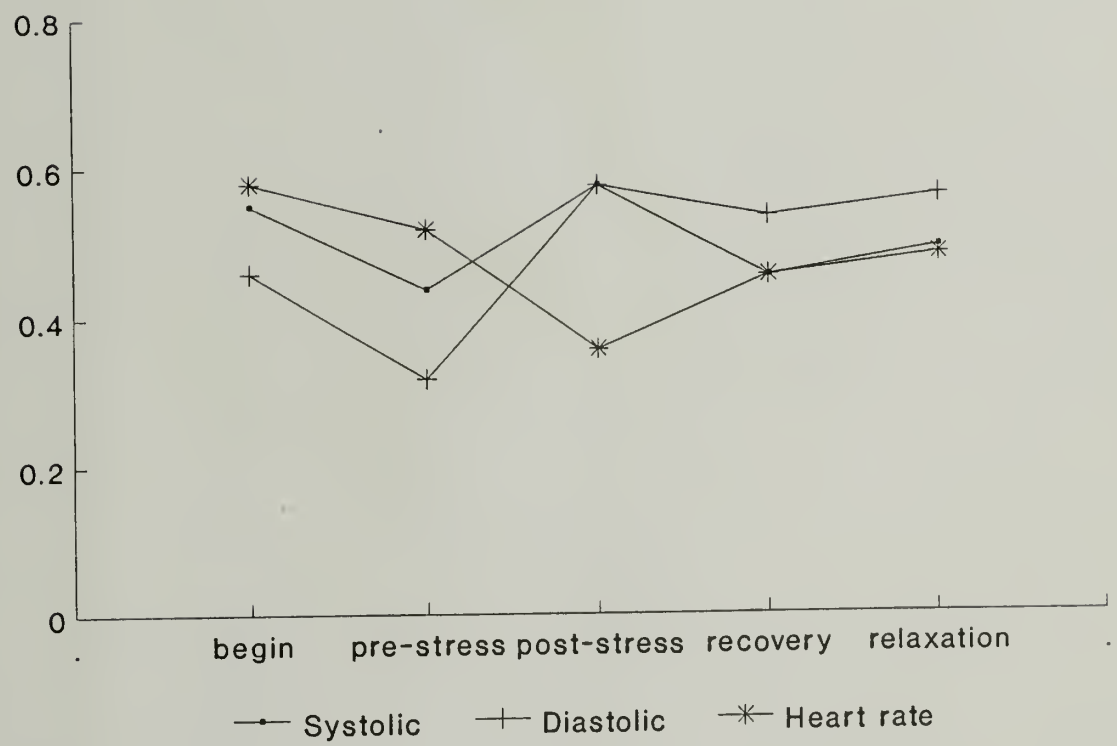
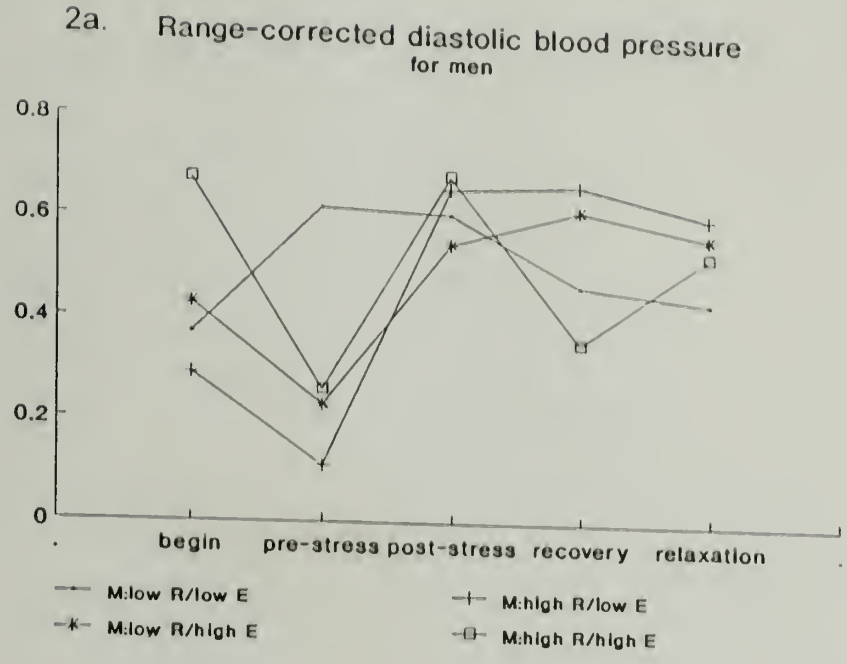


Figure 1. Range-corrected Physiological Measures: Blood Pressure and Heart Rate



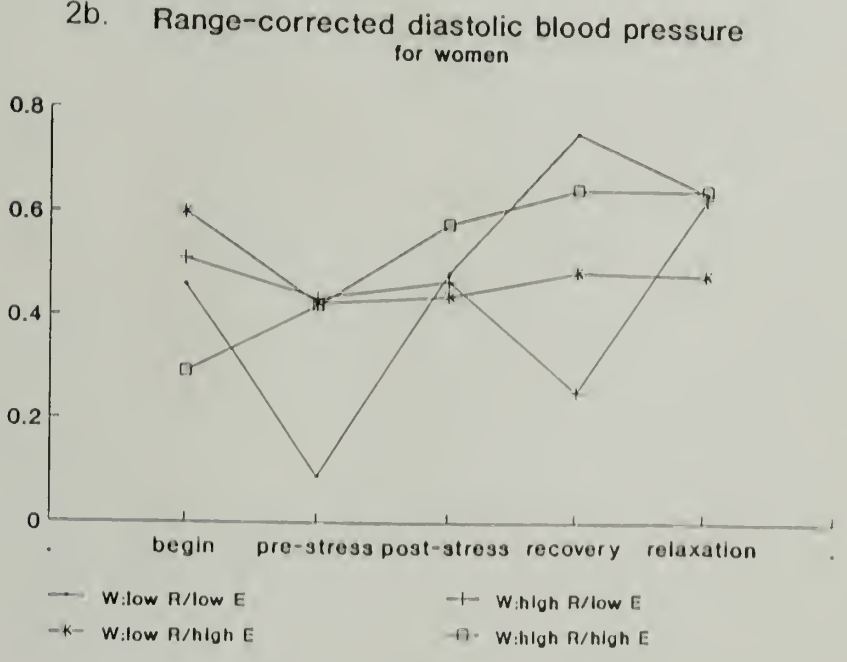


Figure 2. Range-corrected Diastolic Blood Pressure

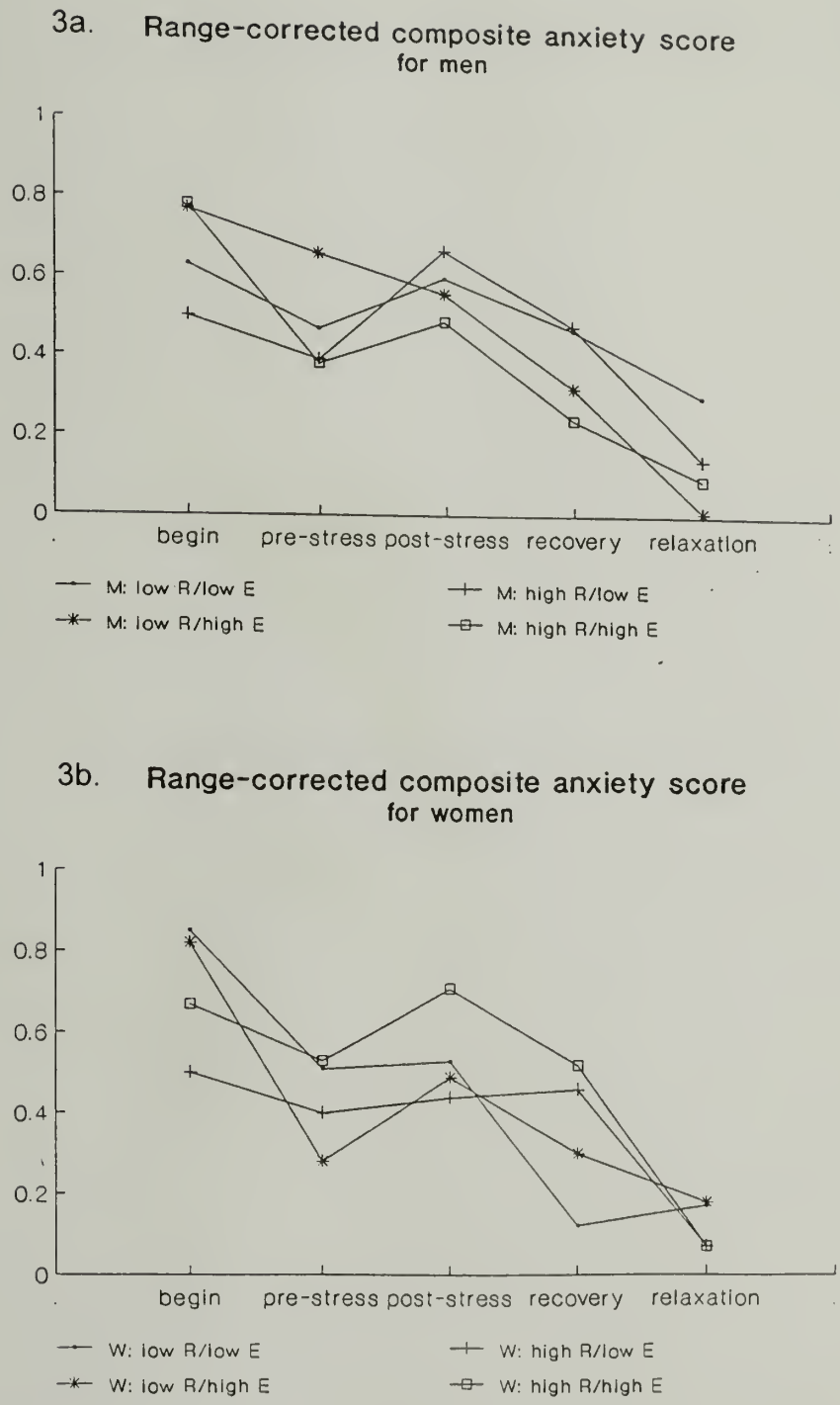
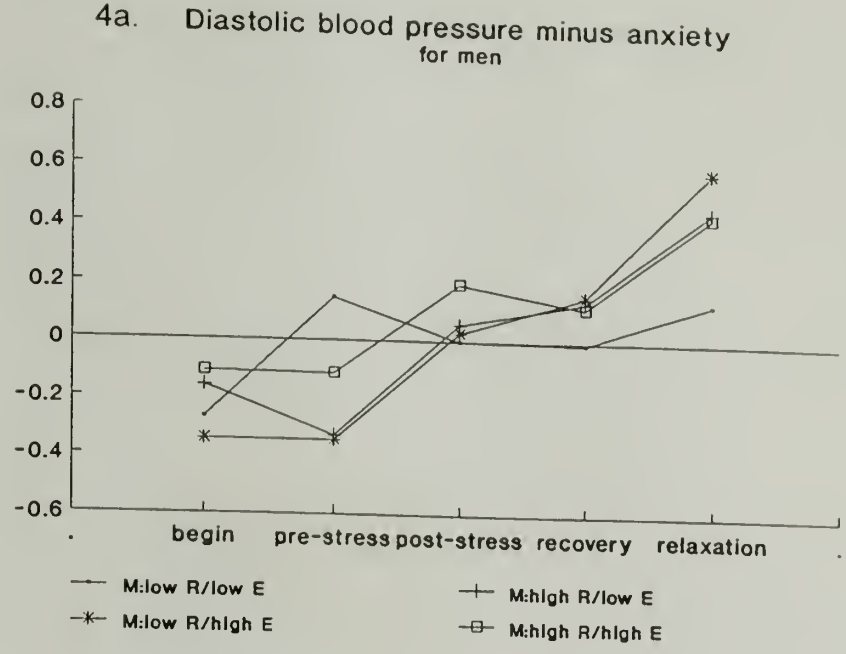


Figure 3. Range-corrected Composite Anxiety Score



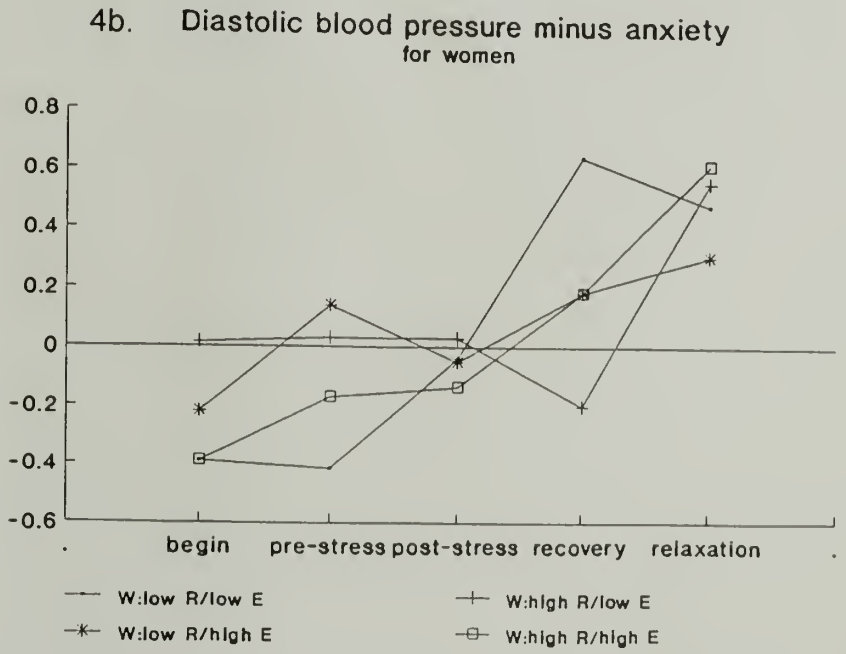


Figure 4. Diastolic Blood Pressure Minus Anxiety

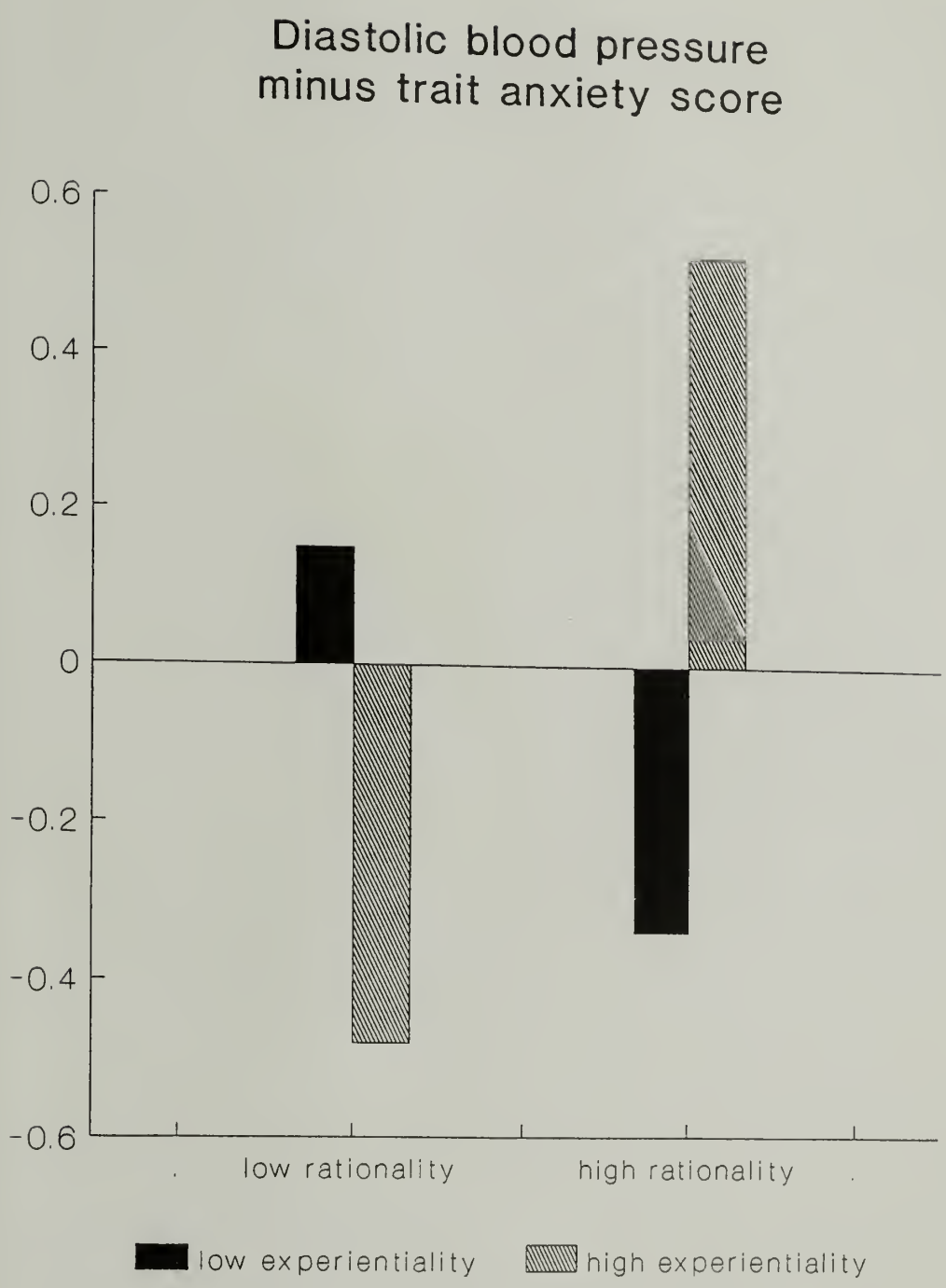


Figure 5. Diastolic Blood Pressure Minus Trait Anxiety Score

REFERENCES

Cacioppo, J. T., Petty, R. E., Kao, C. F., & Rodriguez, R. (1986). Central and peripheral routes to persuasion: An individual difference perspective. Journal of Personality and Social Psychology, 51, 1032-1043.

Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. Journal of Personality and Social Psychology, 39, 752-766.

Davis, P. J., & Schwartz, G. E. (1987). Repression and the inaccessibility of affective memories. Journal of Personality and Social Psychology, 52, 155-162.

Epstein, S. (1973). The self-concept revisited, or a theory of a theory. American Psychologist, 28, 404-416.

Epstein, S. (1990). Cognitive-experiential self-theory. In L. A. Pervin (Ed.), Handbook of personality: Theory and research (pp. 165-192). New York: Guilford Press.

Epstein, S. (in press). An integration of the cognitive and the psychodynamic unconscious. American Psychologist.

Epstein, S., Norris, P., & Pacini, R. (1995). Rational versus experiential inventory. Unpublished test.

Epstein, S., Pacini, R., Denes-Raj, V., & Heier, H. (1994). Individual differences in intuitive-experiential and analytical-rational thinking style. Manuscript submitted for publication.

Greenwald, A. G. (1992). New Look 3: Unconscious cognition reclaimed. American Psychologist, 47, 766-779.

Hill, O. W. (1987). Intuition: Inferential heuristic or epistemic mode? Imagination, Cognition and Personality, 7, 137-154.

Kihlstrom, J. F. (1987). The cognitive unconscious. Science, 237, 1445-1452.

Labouvie-Vief, G. (1990). Wisdom as integrated thought: Historical and developmental perspectives. In R. J. Sternberg (Ed.), Wisdom: its nature, origins, and development (pp. 52-83). New York: Cambridge University Press.

Norris, P., & Epstein, S. (1994). The interaction of thinking and feeling. Unwritten manuscript.

Petty, R. E., & Cacioppo, J. T. (1986). Communication and persuasion: Central and peripheral routes to attitude change. New York: Springer-Verlag.

Reber, A. S. (1989). Implicit learning and tacit knowledge. Journal of Experimental Psychology - General, 118, 219-235.

Sackeim, H. A., & Gur, R. C. (1979). Self-deception, other-deception, and self-reported psychopathology. Journal of Consulting and Clinical Psychology, 47, 213-215.

Schneider, W., & Shiffrin, R. M. (1977). Controlled and automatic human information processing: I. Detection, search, and attention. Psychological Review, 84, 1-66.

Shedler, J., Mayman, M., & Manis, M. (1993) The *illusion* of mental health. American Psychologist, 48, 1117-1131.

Taylor, J. A. (1953). A personality scale of manifest anxiety. Journal of Abnormal and Social Psychology, 48, 285-290.

Weinberger, D. A. (1990). The construct validity of the repressive coping style. In J. L. Singer (Ed.), Repression and dissociation: Implications for personality theory, psychopathology, and health. (pp. 337-386). Chicago: University of Chicago Press.

Weinberger, D. A., Schwartz, G. E., & Davidson, R. J. (1979). Low-anxious, high-anxious, and repressive coping styles: Psychometric patterns and behavioral and physiological responses to stress. Journal of Abnormal Psychology, 88, 369-380.