Winter 1989

Assertiveness, family history of hypertension and other psychological and biophysical variables as predictors of cardiovascular reactivity to social stress

Kim Marie Mooney
University of New Hampshire, Durham

Order Number 9022642

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Mooney, Kim Marie, Ph.D.

University of New Hampshire, 1989

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300 N. Zeeb Rd.
Ann Arbor, MI 48106

ASSERTIVENESS, FAMILY HISTORY OF HYPERTENSION AND OTHER PSYCHOLOGICAL AND BIOPHYSICAL VARIABLES AS PREDICTORS OF CARDIOVASCULAR REACTIVITY TO SOCIAL STRESS

By

Kim M. Mooney

B.A., Franklin Pierce College 1983

M.A., University of New Hampshire 1986

Dissertation

Submitted to the University of New Hampshire
in partial fulfillment of the requirements for
the degree of

Doctor of Philosophy

in

Psychology

December, 1989

This dissertation has been examined and approved.

Rebecca Warner

Dissertation Director

Dr. Rebecca Warner, Associate Professor of Psychology

Ellen S. Cohn

Dr. Ellen Cohn, Associate Professor of Psychology

P. A. Fernald

Dr. Peter Fernald, Associate Professor of Psychology

Neil B. Vroman

Dr. Neil Vroman, Assistant Professor of Physical Education

Carol Williams

Dr. Carol Williams, Associate Professor of Nursing

Nov. 30, 1989

Date

This manuscript is dedicated to my parents,
William and Florence.

In their individual ways, they have been
the wind beneath my wings.

The completion of this graduate program and this dissertation was greatly facilitated by a number of people whose encouragement and humor provided me with necessary motivation when my own resources were low. There were many moments over these past five years when I turned to my family and friends for support and readily found it. For this reason, my accomplishments are not entirely my own and I'd like to acknowledge those people who have shared in this effort with me.

My parents and sisters, Beth and Tracy, have always been my greatest support team and I certainly put them to work during my years at UNH. They offered me patience, understanding and laughter when I needed it most. From my heart, thank you.

I'd also like to thank those people who continue to enrich my life through their many years of friendship and who managed to keep me in touch with the best of the "real world" while I was in graduate school. For rescuing me from my serious self at all the right moments and for their encouragement, thank you Maura Lacey, Judy Sharkey, Lisa Clark and Christine Don. You really made a difference. Thanks to Patty Borzellino and Lisa Sandagata for their consistent support.

I was fortunate to have met many wonderful people while studying at UNH and living in the seacoast area. Graduate school would not have been the same without the

companionship and camaraderie of Charlie DuFour and Natalie Golden. Both personally and professionally, Ellen Cohn has also enriched my years at UNH. I am indebted to Peter Fernald and Victor Benassi for the guidance, flexibility and encouragement they offered during the Teaching Practicum. Meg Swift and Doug and Stephanie Campbell also made my years in the seacoast area so much more enjoyable.

I'd like to thank the members of my dissertation committee and extend a heartfelt and special thanks to my chairperson and advisor, Rebecca Warner. Over the past five years, Becky has impressed me with her generosity, enthusiasm and ideas. Her suggestions and advise on my dissertation project were invaluable. She has taught me by example, and I only hope that in the future I can offer my students the necessary time and patience Becky has always offered me.

The Central University Research Fund also greatly facilitated this project by allowing me to hire a lab assistant whose help with this project went well beyond my expectations or his job description. Thank you Brian Graves.

Finally, I'd like to thank Jon Lawrence. He, more than anyone, has seen this project through to the end with me. I have never met a more giving, considerate person. His support and efforts to make all the recent transitions happen smoothly and with laughter has helped immensely. For all you have done and all that you are Jon, thank you.

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ASSERTIVENESS, FAMILY HISTORY OF HYPERTENSION AND OTHER PSYCHOLOGICAL AND BIOPHYSICAL VARIABLES AS PREDICTORS OF CARDIOVASCULAR REACTIVITY TO SOCIAL STRESS

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This study was conducted to assess whether ceretain personality characteristics and a positive family history of hypertension are associated with excessive cardiovascular reactivity. Subjects (M=28, F=37) engaged in a laboratory task designed to serve as a social stressor. Subjects were separated into three groups based on their self-reports of assertiveness in social situations. It was hypothesized that high and low assertiveness groups would exhibit greater heart rate and cardiovascular reactivity than subjects with average assertiveness tendencies. This relationship was not supported although significant correlations were found between low assertiveness scores and increased systolic

and diastolic reactivity measures. In addition, hostile assertive tendencies were significnatly correlated to heart rate reactivity. Subjects with hypertensive parents exhibited significantly higher task anticipation reactivity than did children of normotensive parents. However, subjects with no family history of hypertension exhibited greater task performance reactivity than subjects with a family history of hypertension. The strongest predictors of resting blood pressure were biophysical variables while the best predictors of cardiovascular reactivity were psychological variables.

CHAPTER I

PERSONALITY VARIABLES AND CARDIOVASCULAR REACTIVITY

Psychological factors are among the many known risk factors associated with hypertension. One's behavioral and personality tendencies may influence one's general state of health (Bloom, 1988; Lynch, 1985). The psychosomatic approach to studying hypertension has examined whether particular personality or behavioral styles will determine blood pressure (Mann, 1986). Two independent psychosomatic research directions have been to identify particular personality traits that may be typical of hypertensives and to examine individual differences in cardiovascular reactivity in response to laboratory stressors (Manuck,Morrison, Bellack & Polefrone, 1985) . To date, evidence for a single `hypertensive' personality type is inconclusive. The role of cardiovascular reactivity also requires further investigation. One purpose of this study is to evaluate the psychosomatic literature from both research approaches. Another purpose is to examine empirically the possible associations between assertiveness and anger expression as personality variables and cardiovascular reactivity. In addition, family history of hypertension and biophysical variables associated with hypertension

will also be examined.

Behavioral Styles and Hypertension

Anger

One behavioral style consistently associated with a hypertensive individual is the lack of personal self-disclosure in social interactions (Cumes,1983; Handkins & Munz, 1978). There is even more convincing evidence for the existence of a relationship between the restricted expression of anger and high blood pressure (Chesney & Rosenman, 1987). Alexander (1939) was the first to propose that certain psychological states could be related to elevated blood pressure. He suggested that inhibited hostility may be critical to the etiology of hypertension. According to Alexander, the hostile person has two conflicting needs: to express hostile feelings and to remain well-mannered and neutral. Numerous empirical studies have since supported his proposal.

Harburg, Erfurt, Hauenstein, Chape, Schull and Schork (1973) also proposed that coping responses which indicate suppressed hostility are related to elevated blood pressure. They conducted an investigation in four areas of Detroit selected for differing levels of socio-ecological stressor conditions. Harburg and his colleagues hypothesized that suppressed hostility would vary between high and low stress residents, between blacks and whites, and would also be related to higher

blood pressure levels. In order to study coping patterns, the researchers had subjects respond to hypothetical questions designed to uncover their potential reactions to aggressive demands placed on them by authority figures. The results showed that the group of males who tended to suppress their hostility in the provocative situations had a higher percentage of hypertensives than did the groups who demonstrated a tendency to express their hostility about the unreasonable requests. Additional results indicated that systolic and diastolic blood pressure averages were highest for people who live in high stress areas, especially black males.

In an attempt to replicate these findings, Dimsdale, Pierce, Schoenfeld, Brown, Zusman and Graham (1986) selected a group of unemployed people as subjects because they were experiencing life stress. They hypothesized that if the stress resulting from unemployment contributed to high blood pressure, then the relationship between the tendency to suppress hostility and elevated blood pressure found by Harburg et al. (1973) might not emerge. However, that relationship was found in this study. The researchers administered the same questionnaire concerning unreasonable requests by authority figures to people who had involuntarily lost their jobs. Subjects categorized as hostility

suppressors based on their responses to the hypothetical questions exhibited the highest systolic readings. Systolic blood pressure was significantly related to suppressed anger. The normotensive subjects reported a greater tendency to express their anger in the hypothetical situations. It is interesting that Harburg's original findings were replicated twenty years later in a different part of the country.

Harburg's methodological strategy did not address whether or not habitual anger-coping patterns expressed over a wide range of situations have an effect on blood pressure (Gentry, Chesney, Gary, Hall & Harburg, 1982). Using a population similar to the one in the original study by Harburg et al. (1973), Gentry and his colleagues investigated whether a general anger-coping pattern over a variety of interpersonal situations is related to blood pressure. Participants were classified as having an "anger in" or "anger out" response style based on their answers to five anger-provoking situations. Subjects who reported an "anger out" style had much lower systolic and diastolic blood pressure readings than those classified as possessing an "anger in" response style. The study also supported the results that persons living in high stress areas experience more anger provoking situations and tend to express their anger less than those residing in a relatively low stress area.

These studies support an association between the suppression of anger and hypertension. It is not clear however, whether anger suppression is involved with the genesis of hypertension or whether it is a result of the condition (Julius, Schneider & Egan, 1985).

Assertiveness

It is unreasonable to assume that individuals with elevated blood pressure or hypertension are constantly angry or more easily angered than their normotensive counterparts (Manuck, Morrison, Bellack & Polefrone, 1985). As implied in the previous studies (Harburg et al., 1973; Gentry et al., 1982) their anger is probably related to specific interpersonal situations and people. Although it is seldom addressed in the literature, an important question for consideration is: Why and when do hypertensive individuals become angry? A number of investigators (Morrison, Bellack & Manuck, 1983; Linden & Feurestein, 1981) propose that a possible answer may be revealed if the focus of the investigations changed from anger itself to the precipitating circumstances. Manuck et al. (1985) suggest that assertiveness, or the ability to express feelings and stand up for oneself, is likely to be the missing link.

Assertiveness, an indicator of social competence, is an essential ingredient for meaningful interpersonal

communication (Manuck, et al., 1985). Individuals who demonstrate little assertiveness and fail to express themselves may suffer from a diminished ability to communicate their needs. This can lead to frustration and anger (Manuck et al., 1985). It may be possible that hypertensives who experience assertiveness problems also experience frustration in social situations. This frustration may lead to anger and the subsequent suppression of that emotional state.

A number of researchers have investigated the relationship between hypertension and deficient affective expression. Keane, Martin, Beeler, Wooten, Fleece and Williams (1982) conducted a study with hypertensives, normotensives and medical outpatients. The subjects were asked to engage in role-play situations that included negative and positive circumstances. When compared with medical outpatients, hypertensive subjects did not role-play significantly differently. When hypertensive and medical outpatient role-play behaviors were compared to those of the normotensive group, a difference did emerge; the hypertensive patients were more compliant and less willing than the normotensive subjects to stand their ground when confronted with pressure during the role-play interactions. Baer, Reed, Bartlett, Vincent, Williams and Bourianoff (1983) found evidence of less effective coping styles in families with a hypertensive

father. During a conflict situation, more gaze aversion occured within the hypertensive family dynamic than a normotensive family interaction. The most prominent examples during the family role playing occurred during negative verbalization and suggested a conflict avoidant style. Although a strong genetic component is thought to exist for the heritability of blood pressure levels (Feinleib & Garrison, 1979), the children of hypertensives may not only be predisposed to physiological risk factors for hypertension, but to psychological ones as well.

Due to the heterogeneous nature of the etiology and mechanisms involved in hypertension, it may be unreasonable to assume that all hypertensives are unassertive or likely to suppress their emotions. Some studies suggest that hypertensives may show more assertiveness than normotensives. This suggests an assertiveness problem but not necessarily a deficit. Baer, Collins, Bourianoff and Ketchell (1979) developed a self-report instrument for assessing personality characteristics associated with essential hypertension. The results showed that hypertensive and normotensive populations differed with respect to two traits, hostility and anxiety. When responding to items that concerned the generation and intensity of emotions that lead to hostility, hypertensive individuals reported

experiencing hostility more frequently than the normotensive respondents and it was usually of a more enduring nature.

Harburg, Blakelock and Roeper (1979) studied the coping reactions of employees who were hypothetically confronted by an angry boss. They hypothesized that coping styles would vary with social status and that these styles are in turn related to blood pressure levels. In their study, Harburg et al. (1979) found that women and middle-class persons tend to use a "reflective" coping style. This refers to the hurt or angered individual by-passing the potential anger response by instead focusing on resolving the situation. The working class population exhibited a greater tendency to express their feelings and resentment toward the boss. Less than 20% of the respondents reported an "anger-in" or passive coping tendency. In addition to these results, Harburg et al. (1979) found that persons whose responses were resentful (i.e., suppressing anger or expressing it aggressively) tended to have significantly higher blood pressure than those who used a reflective coping style. The authors of this study suggested the need for further research on "inappropriate assertiveness" and "inappropriate submissiveness" in relation to blood pressure. Besides being socially inappropriate, it seems that either extreme manifestation

of a coping response could be psychologically and physiologically psychopathological (Linden, 1988).

Cardiovascular Reactivity

Another area of investigation relating behavioral attributes to hypertension concerns individual differences in cardiovascular responsivity to behavioral stimuli (Manuck, et al., 1985). Cardiovascular reactivity refers to significant elevations in heart rate and blood pressure, usually experienced under stressful circumstances. In psychological studies, cardiovascular reactivity is induced by presenting subjects with lab stressors such as complex arithmetic problems to be solved out loud and/or the anticipation of shock. Some people, when exposed to these stressors, show elevations in heart rate and/or blood pressure well above their baseline. Others demonstrate little cardiovascular arousal. Across a wide range of experimental stimuli, hypertensives have demonstrated a greater, more reliable tendency for this increased reactivity than have normotensive controls (Manuck & Garland, 1987).

Manuck, Corse and Winkelman (1978) examined the relationship between individual differences in blood pressure reactivity and characteristics associated with the Type A behavior pattern (e.g. voice volume and speed). Forty-five male lawyers performed a frustrating

task. Their verbal responses were recorded as well as their systolic, diastolic and pulse pressure readings. They found that subjects who demonstrated greater cardiovascular reactivity during the task also exhibited more type A verbal behaviors. They also found that the subjects with the highest peak casual blood pressure readings (systolic only) exhibited the greatest task related reactivity.

A consistent relationship between the tendency for increased cardiovascular responsivity and family history of hypertension has also been demonstrated (Manuck, Giordani, McQuaid & Garrity, 1981; Hastrup, Light & Obrist, 1982; Jorgensen & Houston, 1986). When examining this relationship with a sample of college-age males, Manuck et al. (1981) found that the mean systolic blood pressure measurements were higher for sons of hypertensive parents than normotensive parents although this relationship was statistically significant only during the stressful task and only for those who exhibited heightened cardiovascular reactivity. Manuck et al. (1981) suggested that stress-related reactivity, in conjunction with a familial predisposition for hypertension, may be one psychophysiological indicator of increased risk for hypertension. The work of Hastrup, Light and Obrist (1982) supports this proposal.

Hastrup et al. (1982) examined the relationships

between parental hypertension and the heart rate, systolic and diastolic blood pressure responses of healthy, normotensive college-age males. Physiological measures were taken during relaxation periods and two stressor tasks, a reaction time task and a cold pressor task. The offspring of hypertensive parents had higher HR and SBP than the offspring of normotensive parents under all conditions. The cardiovascular reactivity was most evident at the onset of the stressful reaction time task and less pronounced but still significant during the cold pressor task. Hastrup, Light and Obrist (1979) suggest that cardiovascular responses to tasks that require active coping, such as the demanding reaction time task, may predict future risk of hypertension. Although they point to the role of stress and the subsequent repeated cardiovascular elevations, they do not rule out the influence of personality factors in the development of hypertension.

Jorgensen and Houston (1986) studied whether there are particular characteristics among individuals with a positive family history of hypertension that may be related to cardiovascular reactivity. Personality characteristics were used to identify different subgroups of normotensive college students. These students were further categorized for their positive or negative family history of hypertension. The investigators found that

subjects who had a positive family history of hypertension and were characterized by such traits as denial and unwillingness to report neurotic feelings and aggressive tendencies also demonstrated higher SBP and DBP reactivity than any other subgroup in the study. None of the subgroups with a negative family history of hypertension exhibited dramatic cardiovascular responses to stress.

Integrating Behavioral Styles

The two investigative areas, personality factors and cardiovascular reactivity, have provided substantial evidence that relationships exist between behavioral attributes and hypertension. Traditionally, suppressed anger has been a consistent correlate of the physiological symptoms of hypertension. Recently, the role of assertiveness as a predecessor to anger has instigated a slightly different direction in the psychological research on hypertension. Cardiovascular reactivity has also emerged as a reliable predictor of essential hypertension, particularly in offspring of hypertensive parents (Hastrup, et al., 1979). An integration of the two areas would investigate whether there is a relationship between behavioral attributes of hypertension and cardiovascular responsivity. One compelling question would concern whether people who are high or low cardiovascular reactors could be

differentiated on the basis of specific traits, such as assertiveness.

With this question in mind, Morrison, Bellack and Manuck (1985) conducted a study to examine assertiveness as a behavioral attribute and its relationship to psychophysiological responsivity of both hypertensive and normotensive populations. Subjects participated in videotaped role-play interactions designed to assess individual levels of assertiveness. The videotapes were later coded for the presence and degree of assertive behaviors. Blood pressure and cardiovascular responses were measured throughout the experimental session. Subjects also completed self-report measures.

During the preliminary data analysis, two distinct groups of hypertensives were identified based on the median split of the pulse pressure measure. Group 1 hypertensives exhibited high reactivity during the role-play tasks. Group 2 hypertensives demonstrated lower levels of cardiovascular reactivity compared to Group 1 . Moreover, these groups were not only distinguishable from normotensive in assertiveness, but also from each other. One hypertensive population evidenced unassertive behaviors (Group 2); while the other group displayed inappropriately assertive responses to the situations presented in the role-play test (Group 1). Although Group 1 (high reactivity) received the highest overall

assertiveness ratings on the role-play test, they did not significantly differ from normotensives. Both groups were fairly assertive. Group 1, however, received more ratings in the `hostile' or inappropriately assertive end of the rating scale than did the normotensive group. Group 2 (low reactivity) hypertensives were considered to be generally unassertive. These results imply that excessive assertiveness as well as submissiveness are associated with heightened cardiovascular reactivity.

When combining the results for all 22 hypertensive subjects and contrasting them with the 11 normotensive controls, Morrison et al. (1985) found that the hypertensive subjects were generally more hostile during the role-play task. The normotensive subjects were rated as more socially competent by significant others than were the hypertensive subjects. In addition, the hypertensive participants showed increased diastolic reactivity during the role-play scenarios in comparison with the normotensive subjects. Overall, both hypertensive groups displayed greater diastolic responses during role-play intervals. The results of Morrison, Bellack and Manuck (1985) support the notion that specific assertiveness deficits are related to different subgroups of hypertensive patients based on their cardiovascular reactivity.

As previous studies using established hypertensive

patients have noted, it is difficult to discern whether relationships found between personality attributes and reactivity or even baseline blood pressures are a primary function of hypertension. It is possible that the knowledge of the diagnosis or the prescribed treatment influence subsequent behavioral tendencies in hypertensive patients (Keane et al., 1982; Jorgensen & Houston, 1986; Mann, 1986). It is useful to sample populations that would include normotensives as well as undiagnosed borderline hypertensives to avoid this problem.

Morrison et al. (1985) assigned subjects to their respective groups (high or low cardiovascular reactivity) on the basis of a post-hoc analysis (median split on pulse pressure reactivity). It was after the role-playing responses occurred that grouping was posed as a potential indicator of social competence in terms of assertiveness. It would be interesting to determine if one's degree of assertiveness (submissive vs. excessive) would predict cardiovascular reactivity.

A final consideration extracted from this study is the role of family history for both the hypertensive and normotensive groups. Family history of hypertension was not obtained as a potential variable influencing both assertion skills and cardiovascular reactivity. It is possible that assertiveness, in combination with a

genetic family history of hypertension may be associated with cardiovascular reactivity.

The Present Study

It has been proposed throughout years of research that suppressed anger and assertiveness difficulties (too much or too little) are associated with hypertension (Morrison, et al., 1983; Baer, et al., 1979; Harburg, et al., 1979). It has also been suggested that cardiovascular reactivity under stressful circumstances is involved in the pathogenesis of essential hypertension (Manuck et al., 1981; Light, Hastrup & Obrist, 1981). In addition, a positive family history of hypertension has been indicated as a risk factor for the development of the disease. The relationship between these variables, however, is still undetermined and open to further investigation.

Previous research designed to examine anger and assertiveness as potential risk factors for cardiovascular and behavioral disorders has been obscured by inconsistent definitions and measurement techniques (Chesney & Rosenman, 1985). Both constructs, however, can be thought of in terms of the inappropriate expression of affect, whether of an aggressive or passive nature (Linden, 1987). For this study, I have defined "anger expression" according to the work of Spielberger,

Johnson, Russell, Crane, Jacobs and Worden (1985). They distinguish between anger as an emotional state, the frequency of experiencing angry feelings and the things that people do when they are angry. The latter dimension is of concern in this study. The frequency of expressive behaviors will be assessed by the Spielberger et al. (1985) Anger Expression scale where anger expression is divided into two dimensions. The Anger-in dimension detects how often anger is experienced but remains suppressed. The Anger-out dimension reflects the extent to which one expresses anger when it is experienced.

It has often been the case in the assertiveness literature that this construct has been too broadly defined (Linden, 1984). Assertiveness can refer to behaviors ranging from standing up for one's self, making requests and refusing unreasonable ones to expressing both positive and negative feelings (Manuck, et al., 1985; Linden, 1984). In this study, assertiveness will be defined as the ability to express negative feelings during social interactions. In previous studies, assertiveness has been assessed in various ways. Role-playing has been used in a number of studies (Morrison, et al., 1985; Keane, et al., 1981). In the role-play situations, lab assistants would state one opening line and the subject was then expected to respond as he or she would in real life. Although scoring the behaviors that

occur during role-playing is thought to be a sensitive assessment of assertiveness, it is a time-consuming and somewhat contrived procedure. In this study, assertiveness will be assessed through the use of self-report scales. Although subjects also participate in a modified role-play task, it is a stress manipulation and not an assessment tool.

The present empirical study was designed to assess the relationships between personality characteristics and physiological measures. Subjects' blood pressure and heart rate readings were taken continuously across a series of six experimental trials, with the first and last as baseline periods, and the other (middle) trials as stressor trials. This was accomplished using a continuous noninvasive blood pressure monitor which allows the researcher to follow acute changes in blood pressure as they occur.

The first task of this study was to assess mean blood pressure and heart rate changes across the 6 different trial periods and it was predicted that the mean physiological measures would increase from the initial baseline readings through the stressor periods and then return to resting blood pressure. The next step was to assess whether these changes are related to personality characteristics.

Another purpose of the empirical study was to assess

how assertiveness, as a personality characteristic, is associated with changes in the physiological measures across the experimental periods. It was hypothesized that there would be a difference in physiological changes across trials between extreme assertive groups (passive and hostile) and the average assertive group. It was predicted that subjects with low assertiveness tendencies would exhibit greater mean changes in systolic, diastolic and heart rate readings compared to the group categorized as average assertiveness group. Similarly, subjects reporting excessively assertive behaviors were predicted to exhibit elevated blood pressure and heart rate readings across the experimental session than subjects reporting effective coping or moderately assertive characteristics.

Another purpose of the present study was to assess the relationship between family history of hypertension and physiological reactivity. It was predicted that subjects with a positive family history of hypertension would exhibit greater physiological changes across the trials than those without a family history of hypertension. Although no predictions were made, changes in systolic and diastolic blood pressure and heart rate were examined for sex differences as well.

Cardiovascular change scores were calculated for specific stressor manipulations and used as another

assessment of reactivity. It was predicted that high and low assertiveness groups would exhibit greater change scores than the average assertiveness groups. Similarly, those with a positive family history of hypertension were expected to exhibit greater reactivity under these specific stress manilpulations than those with no genetic predispostion. No predictions were made about differences in reactivity between male and female subjects.

Another purpose was to assess the power of the psychological and biophysical variables to predict resting heart rate and blood pressure and cardiovascular reactivity. Few researchers have have utilized regression analyses to assess the contributions of these variables to the variance accounted for in baseline and reactivity measures (Linden, 1984). One of the few studies did find that biophysical variables, such as weight and genetic predisposition for hypertension, did account for almost 30% of the variance in resting blood pressure (Stamler, Berkson, & Dyer, 1975). Furthermore, the relative contributions of psychosocial and biophysical variables have not been explored. The predictive power of the assertiveness and anger-expression variables were compared to the predictive power of such variabels as weight, amount of exercise, and family history of hypertension. No predictions were made concerning which

subsets of variables would be the most powerful predictors of baseline and reactivity measures.

In addition to the other novel features of this study which include the use of a continuous blood pressure monitor, the role play situations without a confederate, and the collection of data from both male and female subjects, a self-report measure, the Social Scenario Assertiveness Scale was developed. Before discussing the empirical study, the conceptualization behind the scale's development and format are discussed in the next chapter.

CHAPTER II

INSTRUMENT DEVELOPMENT

The Social Scenario Assertiveness Scale (SSAS) is based on a conceptualization similar to that first used by Harburg et al. (1973) and later by Gentry et al. (1982) to assess the expression of anger in their research. Harburg's method provided subjects with one or two provocative scenarios where authority figures were represented as antagonistic and threatening. Subjects were asked to imagine themselves as targets of these provocations. The subjects then chose one of three given behaviors that they felt represented how they would respond in that situation. Spielberger et al. (1985) criticized this assessment technique for various reasons and these problems have been addressed in the development of the Social Scenario Assertiveness Scale.

One problem with the assessment procedure developed by Harburg et al. (1973) concerned the relevance of the situations for populations other than adults living in a large city like Detroit (Spielberger, et al., 1985). In addition, Harburg apparently did not query whether the hypothetical situations and the corresponding response alternatives were ever actually experienced by their subjects or a representative sample from the population. Another limitation of Harburg's procedure according to Spielberger et al. (1985) is that the subjects are

subsequently categorized as possessing either Anger-in or Anger-out response styles on the basis of their responses to only two scenarios. The first issue is addressed in Pilot Study 1 and the latter in Pilot Study 2. Also, the piloting procedures used in the development of the SSAS utilized approximately 14 scenarios and the final version of the scale includes 11 scenarios and 6 response alternatives for each, thus enhancing its ecological validity. In addition to addressing these issues, this new scale includes response choice items that include "pathological" assertiveness responses in that they represent both ends of the continuum (too hostile, too passive).

Pilot Study 1

This study was designed to generate realistic social scenarios that college students may experience. The scenarios are troublesome in nature in that they could potentially make the participants frustrated or uncomfortable. In addition, potential responses to those scenarios were also elicited.

Method

Subjects. Twenty-seven students (13 males, 14 females) ranging in age from 18 to 22 years, participated in this study. All were volunteers form Introductory Psychology classes and received credit for their

participation.

Procedure. First, scenarios designed for a college population were generated independently by a number of people. These situations involved interpersonal conflict in both formal and informal settings with strangers or with friends. The subjects received 10 scenarios and were asked to imagine themselves in each situation. The were asked after each vignette to describe what they would be most likely to do in that situation. At the end of the questionnaire, subjects were asked to describe a social or interpersonal situation that happened to them within the past two years that they considered to be a negative or uncomfortable social situation.

Results

The original list of scenarios given to subjects is presented in Table 1. Subjects generated responses describing what they would do if in each situation. Scenarios 3, 7, 8 and 10 were discarded as they were either difficult to answer or there was no variability in subjects' responses.

[Insert Table 1 here]

Discussion

The scenarios which subjects had difficulty responding to or which resulted in similar responses were

discarded. The scenarios generated by subjects that were too personal (i.e., could not be described as a social scenario) were also not used in subsequent pilot studies. A total of 14 scenarios were retained for the next pilot study. A series of behavioral alternatives for each scenario was compiled from the subjects' responses and used in Pilot Study 2.

Pilot Study 2

This pilot study was conducted to address the Spielberger et al. (1985) contention that it is necessary to find out if the population being studied actually experience events similar to those represented in the scenarios. In addition, this study also assesses how frequently the response alternatives for each scenario are engaged in, if in fact, someone finds him or herself in that social situation.

Method

Subjects. Fifty-four students (14 males, 39 females) from Introductory Psychology classes received credit for their participation in this study. Subjects ranged in age from 19 to 23 years.

Procedure. Subjects were given a series of 14 social scenarios and a list of behavioral responses after each. The participants were asked two questions after each vignette: Has this or a similar situation ever happened

to you?, and if so, Have you ever engaged in any of the following behaviors?

Results

Scenarios were considered to be realistic and engaging if at least 50% of the participants reported having experienced similar situations. Eleven of the fourteen social scenarios were considered to be suitable for the scale. The percentages of subjects claiming that they have been involved in similar scenarios can be seen in Table 2.

[Insert Table 2 here]

The response alternatives that received at least one subject's endorsement were retained and used in the subsequent scenario pool for the next pilot study.

Discussion

These two pilot studies addressed the Spielberger et al. (1985) criticisms of Harburg's (1973) use of social scenarios in assessing anger coping styles. All but a few scenarios represented realistic events for both men and women in this college sample. The personal experiences that students report tend to be similar in nature but the ways in which people respond to them do differ considerably. For the purposes of the empirical study, it was important that the ways in which people

respond to the given situations vary. The final version of the Social Scenario Assertiveness Scale was used as an assertiveness assessment tool. The scale is designed to be sensitive to extreme aspects of assertive behavior; to differentiate between passive, appropriate and hostile response tendencies. In the final version, each scenario response alternative will represent one of these three possible degrees of assertive behavior. It is important to have more than two or three response alternatives in order to enhance the scale's ecological validity (Spielberger, et al., 1985).

Pilot Study 3

The third pilot study was conducted to obtain categorical consensus for each response alternative for the 11 remaining scenarios. This study required subjects to decide if each behavioral alternative represented either a passive, assertive or hostile response in relation to the given scenario.

Method

Subjects. Twenty-three students (11 males, 12 females), ranging in age from 18 through 24 participated in this study and received course credit.

Procedure. Subjects were given a series of eleven social scenarios and approximately 8 behavioral alternatives after each one. The subjects were asked to

consider the situations and then rate the subsequent responses to individual situations as being overly assertive (almost hostile), assertive (appropriate), or unassertive (passive). Numbers representing one of the three assertiveness categories were assigned to each behavioral alternative.

Results

The modal assertiveness ratings for the behavioral choices were calculated for the 11 scenarios. Two responses representing each assertiveness category were retained for the final version of the SSAS. These were chosen on the basis of categorization agreement between subjects (see Table 3). The six behavioral responses retained for each scenario and the assigned assertiveness categories are also presented in Table 3.

[Insert Table 3 here]

Discussion

The purpose of this pilot study was to assign each SSAS item response choice into one of three "social assertiveness" categories. The modal rating for each response determined whether that alternative represented a passive, assertive or hostile response relative to the given situation. The percentage of subjects who endorsed that rating was evaluated and most of the response

categories showed an agreement over 60%. The six responses retained for each scenario represent the two choices from each assertiveness category with the strongest rating agreement.

General Discussion

This scale was developed as a self-report measure of assertive behaviors in social situations. Although it has been designed for college students, slight changes in the described situation would probably allow for generalization to other adult populations. The scenarios included in the final version of the SSAS are considered to be representative social circumstances that actually do happen. The behavioral response alternatives were generated mostly by the population that this scale will assess and were deemed as representing how people really do behave in given situations.

The forced choice format of this scale does not allow for independent measures of passivity and hostility. Response choices that are hostile in nature automatically exclude unassertive responses. However, the response alternatives offer an advantage over other self-report measures of assertiveness because they include behaviors representing varying degrees of assertiveness from extremely passive to hostile responses. In addition to providing a measurement of assertiveness that includes

these socially inappropriate aspects, another goal in developing this measure is to better predict baseline blood pressure and cardiovascular reactivity than other self-report measures.

Reliability

The reliability of the SSAS was assessed using a test/retest method. Thirty-eight volunteers from two social psychology classes participated in this procedure. The scale was administered on two separate occasions approximately 6 weeks apart. On each occassion, subjects were asked to read the 11 scenarios and choose one response for each that best represented what they would most likely do under similar circumstances. Using the coding scheme developed in Pilot Study 3, these responses were numerically coded as either hostile (3), assertive (2), or passive (1) responses. The sum for the 11 items served as the total SSAS scores. The correlation coefficient between the scores from the first and second administrations was .68.

Reliability coefficients were also calculated for the other self-report measures used in the emperical study. In addition, a passive scale and a hostile scale were calculated from the Social Scenario Assertiveness Scale responses. The alpha coefficients for each of the scales are presented in Table 4.

[Insert Table 4 Here]

Intercorrelations Among Measures

To examine relations among the psychological variables, correlations were computed between the assertiveness scales, anger expression scales and the social desirability measure. The data are displayed in Table 5.

[Insert Table 5 Here]

As predicted, the Rathus assertiveness scale was negatively related to the anger-in scores but positively correlated to anger-out scores. The Marlowe-Crowne Social Desirability score was negatively correlated to both aspects of anger-expression. As social desirability increases hostile anger-expression decreases and extreme repression of anger decreases as well. as expected, the Passive SSAS measure was significantly and inversely related to the Hostile SSAS measure. It was not significantly correlated to any of the other measures. The Hostility scale was positively correlated with the anger-out measure and negatively correlated to the Marlowe-Crowne Social Desirability Scale.

CHAPTER III

THE EMPIRICAL STUDY

The present study was conducted to test the relationships between the following variables: assertiveness, anger-expression, social desirability, blood pressure and heart rate. The relationship between family history of hypertension and the physiological measures was also explored.

Method

Subjects

Subjects were 65 (28 male, 37 female) undergraduate volunteers from introductory psychology courses and one introductory social psychology course. The mean age of the participants was 19.6 years. All subjects read and signed an Informed Consent Form (see Appendix A) and received course credit for their participation. All subjects were white. Fifteen of the 65 subjects had a family history of hypertension. Eighty-five percent of the participants were nonsmokers.

Instruments

Self-report Measures. Subjects were asked to provide demographic information in addition to physical health related information such as their height, weight, hours of exercise per week and number of cigarettes smoked per day. Prior to the physiological monitoring, subjects

also completed the following self-report scales:

The Marlowe-Crowne Social Desirability Scale (Marlowe & Crowne, 1960). This scale is a 33 item True/False assessment of the tendency subjects may have to present themselves in a favorable light during experimental procedures.

Spielberger's Anger-In/Anger-Out Measure (Spielberger, et al., 1985). This is a 20 item , 4 point Likert scale directing subjects to indicate how often they behave in a particular manner when they are angry. It is an overall anger-expression measure with 2 subscales: Anger-in which measures suppressed anger and Anger-out which measures anger expressed toward other people and the environment.

Rathus Assertiveness Scale (Rathus, 1973). This is a thirty item schedule for measuring assertiveness using a 5 point Likert format. Subjects agree or disagree with statements describing responses to social situations.

Social Scenario Assertiveness Scale. This scale includes eleven scenarios and provides 6 behavioral alternatives for each in a forced choice format to assess assertiveness.

Family History of Hypertension Survey. This survey includes brief questions concerning whether the subjects' biological parents have ever been diagnosed as hypertensive (Appendix C). They are presented in a

yes/no format. Information about the subject's history is also obtained. A similar follow-up survey is sent to each subjects' parents.

Behavioral/Stressor Task. Subjects were asked to prepare brief speeches as `role-play' responses to two stimulus scenarios (see Appendix B). Because the task involved both preparing and undertaking attempts to influence another person (Smith, Allred, Morrison & Carlson, 1989) it was considered to possess characteristics requiring subjects to "actively cope" as opposed to passively deal with the aversive situation. The coping requirements of the laboratory stressor influence the degree of eleicited cardiovascular reactivity (Obrist et al., 1979). Although the influence attempts were not presented to an actual person, the play-acting was video-taped by the experimenter (Levinson, Oyama & Meek, 1987; Manuck et al., 1985).

The task is relevant to the study of the relationship between assertiveness and cardiovascular reactivity as it is social as opposed to strictly cognitive in nature and requires subjects to "play-act" in two different social influence situations. One situation involves attempts to avoid negative circumstances, in this case, the subject tries to persuade a store manager that he/she did not intentionally shoplift some merchandise. The other

situation involves attempts to attain a positive outcome, such as convincing a scholarship committee that he/she is the most deserving candidate for a financial award.

The speeches were videotaped using a Camcorder. Subjects were told that the videotapes would be subsequently reviewed by objective raters for performance quality. This assessment is not however, part of the present study. Self-evaluations of task performance were also be obtained. Responses to open-ended questions concerning the subjects' self-perceptions of assertiveness and their definitions of assertiveness and aggressiveness were elicited.

Physiological measures. Measurement of systolic blood pressure (SBP), diastolic blood pressure (DBP), and heart rate (HR) were obtained with a FINAPRES 2300 (Ohmeda). This instrument has a small cuff with an infra-red light source and detector which is placed on the middle finger of the subject's nonpreferred hand. This cuff tracks finger artery volume. Readings of SBP, DBP and HR were printed out at one minute intervals throughout the session. Finger pressure monitoring is considered to be reasonably precise (Wesseling, Settels & DeWit, 1986). Finger systolic pressure overestimates upper arm pressure by 6 mmHg. on average and underestimates Korotkov diastolic pressures by 3 mmHg. on the average.

Procedure

Subjects participated in the study individually. They were greeted by one of two trained experimenters and brought to a small waiting area. The experimenter left the area while the subject read and then signed an informed consent agreement (see Appendix A). This form included information pertaining to the impending physiological monitoring but no description of the role-play task as that was a potential stressor. Once the form was signed, the subject was told that the main purpose of the study was to assess the relationship between individual physiological variables, such as heart rate and blood pressure and task performance. The nature of the task was not explained at this time. At this point, the subject was given the self-report scales and told that they should take approximately 20 minutes to complete them. It was also mentioned that if he/she should finish before the experimenter returned to feel free to relax and read one of the available magazines.

After 20 minutes, the experimenter returned and took the subject to another room where he/she was directed to a comfortable chair. The finapress and printer were on a table near the subject but not in such a position that either could be read. It was explained that the Finapres would monitor heart rate and blood pressure automatically throughout the experimental session by the

small cuff to be placed around the middle finger of the nondominant hand. Each subject was also instructed to keep unnecessary talking and movement to a minimum. The experimenter instructed the subject that he/she could continue to read as the instrument had to have time to adjust for a approximately 7 to 10 minutes.

After 10 minutes, the experimenter returned and provided the subject with instructions for the subsequent task. Specifically, the subject was told that he/she would be given two scenarios to read (see Appendix H). They were then to imagine themselves in each of those situations and prepare a reaction, or what they would say if they were actually in those situations. At this time, the subjects were told that these responses would be videotaped and later rated for "how convincing and persuasive" they were. Subjects were further instructed that they had ten minutes to prepare the two responses. It was suggested to each subject that he/she should outline the reactions as opposed to writing them out in their entirety. This allowed subjects to make better eye contact with the camera while they were being videotaped. The order in which the two scenarios were presented was counterbalanced across subjects. The experimenter left the room for approximately 10 minutes.

Once sufficient preparation time had passed, the experimenter returned to the lab with a handheld

camcorder. Once the recorder was in place, the subject was further instructed that he/she would receive a verbal prompt for each scenario. Subjects' responses for each scenario were then recorded. After the task was completed, subjects were asked to complete a series of brief questionnaires including a performance evaluation. On a 1-7 Likert scale, subjects rated how influential they were during each of the speeches. Subjects also completed a brief family history of hypertension questionnaire. Permission was requested to send a similar follow-up questionnaire concerning the family history of hypertension home to a parent.

Once this was done, the subject was told that he/she had completed the experimental requirements and debriefing would occur in approximately 10 minutes after he/she relaxed.

Measurement Periods

After each subject particpated in the procedure, the physiological data was separated into 6 measurement periods representing the different experimental manipulations. These measurement periods commenced upon placement of the Finapress cuff. Systolic and diastolic blood pressure and heart rate were recorded every 60 seconds within each period. Mean SBP, DBP, and HR were calculated for each of these 6 periods. These

measurements served as dependent variables for the subsequent statistical analyses.

The first period was the initial baseline trial during which resting measures of cardiovascular activity were obtained. The second, third, and fourth periods were associated with the "social stressor" task designed for this study. The fifth measurement period was a recovery period because it involved no stressors. The final period was a relaxation period during which each subject was allowed to rest and read in order for their cardiovascular activity to return to baseline levels.

The first baseline period lasted 10 minutes and allowed the subject to acclimate to the Finapress and laboratory environment. The second period, which was 2 minutes long and also considered to be the initial stressor period, involved the verbal instructions for the task. It was considered to be stressful because it was revealed to the subjects that they would eventually be videotaped.

The third period was the 10 minute preparation time given to each subject before they actually performed the task in the fourth period. The third period is considered a stressor period as it requires the subject to anticipate the subsequent task (Smith et al., 1989). When each subject had approximately 10 minutes to work on their play-act speeches, the experimenter returned with a

handheld camcorder which was set up and adjusted for each subject. During the fourth period, each subject was videotaped while play-acting a reaction to each hypothetical social situation. The time span for the fourth period varied with each subject but usually lasted for 4-5 minutes.

The fifth period of cardiovascular readings was a recovery time which lasted for approximately 6 minutes. During this time, subjects evaluated their performance for each of the two role-play performances and completed a family history of hypertension survey.

The sixth and final period was a baseline session which lasted ten minutes. Once the Finapress was removed, the subject was debriefed and given an opportunity to ask the experimenter questions. Also, the print-out of the subject's physiological readings was reviewed for evidence of extreme blood pressure or heart rate readings.

Calculating SSAS Scores

Using the coding scheme developed in Pilot Study 3, the SSAS was scored according to the individual responses made for each of the 11 scenarios. Once a numerical value representing one of the assertiveness categories was assigned to each response, the number of passive and hostile responses were calculated. This scoring method

provided two scales; the "passive" scale consisting of all the unassertive responses and the "hostile" scale consisting of the overly assertive responses. A median split for each of these scales was obtained. Subsequently, there was a high/low passive scale and a high/low hostile scale. A crosstabs analysis was performed on these scales. This yielded 4 potential groups but one was dropped because of its small number (N=2). The remaining groups represented those subjects with passive, hostile or appropriately assertive tendencies. Subjects with 3 or more unassertive responses for the 11 scenarios were categorized as passive (N=22). Similarly, subjects with 3 or more overly assertive responses were categorized as hostile (N=18). Subjects with less than 3 unassertive responses and less than 3 hostile responses for the 11 scenarios comprised the appropriately assertive group (N=23).

Calculating Family History of Hypertension

Information about the family history of hypertension was solicited from each subject. Similar questionnaires were sent to subjects' parents and 90% of these were returned. As subjects tended to overestimate the incidence of hypertension in their families, the more conservative reports received from the parents were used. Combining information for the biological mothers and

fathers, 35% of the 57 cases reported that one or both of the biological parents had been diagnosed as hypertensive.

CHAPTER IV

RESULTS

Mean Physiological Changes Across Trials

One question addressed in this study concerned the change in cardiovascular activity over the 6 physiological measurement conditions. It was hypothesized that blood pressure and heart rate would be the lowest at the very beginning of the experimental session during the 10 minute baseline period. Physiological activity was expected to increase throughout the 3 stressor periods and then begin to return to baseline during the recovery period. The pattern of the blood pressure and heart rate means across the 6 trial periods support this hypothesis. The means for SBP, DBP, and HR across the 6 diffferent trial conditions are presented in Table 6. The pattern of means for all three variables suggested that as the task performance became imminent, physiological arousal increased, peaked during the actual performance, and then subsided once the task was clearly over.

[Insert Table 6 Here]

A multivariate approach to a one way repeated measures ANOVA was conducted on each of the physiological dependent measures to test the degree of change across the 6 trial periods. Mean SBP, DBP, and HR readings for each trial served as the dependent variables. The 6 trial periods served as the within subjects factor for each ANOVA and both multivariate and univariate Fs were calculated because assumptions about the variance-covariance matrix were violated (Norusis, 1985). A multivariate test of significance (Wilks Lambda) [F(5,59)=58.03, p<.001] showed a significant within subjects effect across trials for systolic blood pressure. The averaged univariate F-Tests supported these results (see Table 7). Similarly, the multivariate effects for diastolic and heart rate trials shown respectively, [F(5,58) =52.97 ,p<.001] and [F(5,59)=44.34,p<.001] were also significant. The univariate F-Tests for both physiological measures were also significant (see Tables 7). This leads to the rejection of the null hypothesis that no differences exist among the trial means.

[Insert Table 7 Here]

Paired t-Tests[1] were conducted to identify the trials that differed from the initial baseline trial

measurements. For each of the physiological variables, SBP, DBP, and HR, it was predicted that the means for the stressor periods (trials 2, 3, and 4) would significantly differ from their respective baseline means. The means for trials 5 and 6, the recovery and second baseline periods respectively, were not expected to significantly differ from baseline. For SBP, all of the trials, including the recovery and return to baseline trials, differed significantly from the first baseline. The results were similar for the diastolic trials (see Table 8). In the HR trials, however, the recovery period and the return to baseline trial did not differ from the original baseline trial.

[Insert Table 8 Here]

Interaction Effects

Baseline blood pressure values and heart rates were examined for the 3 SSAS assertiveness groups (passive, assertive, hostile) and family history (positive, negative) groups. Baseline differences between the independent groups, the SSAS groups or family history groups, may contribute to seemingly reliable differences in responses or reactivity to stressor manipulations (Benjamin, 1967). Although the blood pressure and heart rate means for the Passive and Hostile groups were expected to be higher than Assertive group means, no

significant group differences were found. Systolic, diastolic and heart rate baseline means for those with a positive family history of hypertension did not differ significantly from those with no family history. Sex diifferences were also examined and men and women did not significantly differ in their baseline blood pressure readings or heart rates.

[Insert Table 9 Here]

In order to test the hypothesis that high and low assertiveness groups would exhibit greater physiological changes from baseline across the 6 trial periods than the average assertiveness group, separate oneway repeated measures ANOVAs were run for each physiological dependent variable with 3 levels of SSAS as a factor. A similar series of analyses were conducted to test the hypothesis that children of hypertensive parents would exhibit greater changes in blood pressure and heart rate levels across the 6 trials periods. Differences between men and women were also explored.

The results of each oneway repeated measures ANOVA indicated that none of these interactions were significant. Thus, the pattern of mean cardiovascular change from baseline measures across the 6 trials was not significantly different between men and women, between high, average or low assertiveness levels, or

between positive or negative family history of hypertension.

[Insert Table 10 Here]

Cardiovascular Change Scores

Besides assessing mean changes across each of the experimental trials, an alternative and more common assessment of cardiovascular reactivity is the calculation of change scores.[2] Gain scores were used in this study and they represent the difference between one measurement period and another. For this study, change scores for SBP, DBP and HR were calculated for two stress periods and one recovery period. The "Anticipation" stress period change score was calculated by subtracting subjects' baseline scores from the trial score immediately preceding task performance (trial 3). The "Performance" stress period change score represents the difference between the anticipation trial and the performance trial scores (trial 4 - trial 3). "Recovery" change scores were calculated as the difference between the subjects' recovery period scores (trial 5) and the preceding stress period (trial 4). The three mean change scores for each dependent variable are presented in Table 11.

[Insert Table 11 Here]

In order to assess the difference in magnitude between the change scores, a multivariate approach to a one-way repeated measures multivariate analysis of variance (ANOVA) was conducted on each of the dependent measures. No predictions were made concerning which of the three change scores for blood pressure and heart rate would be the largest. Mean systolic change scores, however, were expected to be greater than mean diastolic and heart rate change scores.

The mean change scores for systolic blood pressure, diastolic blood pressure and heart rate served as separate dependent measures. The 3 change score periods served as the within-subjects factor. A multivariate test of significance (Wilks' Lambda) [F (2,63)=4.44, $p < .02$] indicated a significant main effect for systolic change scores. Repeated measures results for the diastolic change scores [F (2,64)=3.01, $p < .06$] and heart rate change scores [F(2,63)= 3.37, $p < .05$] were also significant. These results, in addition to the univariate results are presented in Table 12.

[Insert Table 12 here]

Paired t-tests were conducted to explore the differences between the three change scores calculated for each physiological measure. Significance was again determined by using the Bonferroni adjustment. Mean

systolic change scores were greater than diastolic and heart rate change scores. All three systolic change scores differed significantly from the others. The performance change score calculated for each physiological measure differed significantly from their respective recovery scores (see Table 11).

Interaction Effects

The hypothesis that passive and hostile groups would exhibit greater cardiovascular reactivity than the appropriately assertive group was tested. In addition, the hypothesis that those with a positive family history of hypertension would exhibit greater reactivity than those with no genetic predispostion for hypertension was also tested. The effects of sex on change scores across the 3 physiological measures was also explored. Systolic, diastolic and heart rate change scores served as 3 separate sets of dependent variables. Multivariate tests were run separately for each set of change scores and factors were included individually.

The assertiveness groups by change score trials for all three physiological measures failed to reach statistical significance. The multivariate tests for the sex by change scores interaction also failed to reach statistical significance for the systolic, diastolic and heart rate variables. However, the pattern of systolic

change scores across the three reactivity periods significantly differed between those with a positive and negative family history of hypertension.

[Insert Table 13 Here]

Post-hoc analyses indicated that those with a positive family history of hypertension exhibited significantly higher ($p < .05$, 1-tail) mean systolic anticipation change scores (M=25 mmHg) than those without a family history of hypertension (M=18mmHg). However, those with a hypertensive family history exhibited significantly lower ($p < .05$, 1-tail) mean systolic performance change scores (M=15mmHg) than those without a family history of hypertension (X=21mmHg). There was no significant difference between the groups for mean recovery change scores. There was no interaction effect for family history and diastolic and heart rate change scores.

Intercorrelations Among Measures

Correlations between the psychological variables and mean baseline measures were examined. A reactivity score between baseline and task performance measures was calculated (trial4-trial1). The relations between the psychological scales and this change score were examined. The results are presented in Table 14.

[Insert Table 14 Here]

Correlations between the biophysical variables and baseline reactivity scores were examined. The results are presented in Table 15.

[Insert Table 15 Here]

Multiple Regression Analyses

Another question addressed in this study concerned the role of psychological and biophysical variables in predicting cardiovascular baseline activity and stress-related reactivity. The predictive power of the Rathus, passive and hostile assertiveness scales,the anger-expression scales and some biophysical variables were examined using multiple regression. In addition, the relative predictive power of the psychological variables in comparison to known physical predictors of cardiovascular activity was examined.

Separate multiple regression analyses were performed between baseline systolic, diastolic and heart rate measures as individual dependent or predicted variables and the psychological scales and weight, hours of exercise per week, cigarette smoking and family history of hypertension as independent or predictor variables. Similar regression analyses were done for systolic and diastolic and heart rate reactivity scores as dependent measures. The Test Regression method used to build each equation allowed subsets of variables to be tested for

their contribution to a change in R Squared when they are removed from the model.

After all of the independent variables were entered into the regression equation, two subsets of variables were tested in each multiple regression analysis. The subset containing psychological variables differed for each dependent variable. Only those variables with significant or nearly significant correlations to the dependent variable were tested. The subset containing the biophysical information remained the same for each dependent variable being tested. These variables were weight, hours of exercise per week, number of cigarettes smoked per day and a positive or negative family history of hypertension. For the purpose of reporting this constant subset in a table, it is referred to as Physical Health.

Baseline Dependent Measures

A multiple regression analysis was performed between baseline systolic blood pressure as the dependent variable and the Rathus assertiveness scale, the anger-in, anger-out scales, and the SASS Passive and Hostile scales as independent variables. Physical health variables also served as independent or predictor variables. Table 16 displays the results of the equation when all the independent variables are entered in the

equation. R for regression was not significantly different from zero [F,(9,46) = 1.23, p =ns]. A similar regression analysis was conducted with baseline diastolic blood pressure as the dependent variable. When all of the independent variables were entered in the equation, 36% of the variance in baseline DBP was accounted for but R was not significant [F,(9,46)=.73, p =ns]. Resting heart rate also served as a dependent measure in a separate multiple regression analysis and when all independent variables were entered in the equation, R was not significantly different from zero, [F,(9,46)=1.44, p=ns].

[Insert Table 16 Here]

Testing Subsets

Two subsets of independent variables were tested for their contribution to R Squared (.19) for baseline systolic blood pressure. The subset of psychological variables included the Rathus scale, anger-in and anger-out variables. This subset contributed a change of .02 in R Squared. The physical health subset contributed a change of .09 to the equation. Neither subset contributed a significant change in R Squared. The subsets and the contributed change values are presented in Table 17.

[Insert Table 17 Here]

Two subsets of independent variables were tested for their effect on R Squared (.13) for the diastolic baseline dependent variable. The psychological independent variables tested included the anger-in and anger-out scales. Their contribution to R Squared was .02 compared to the .06 contribution of the physical health variables. The independent variables tested for the baseline heart rate dependent variables were the Rathus scale, the anger-in and passive scales. This psychological variable subset contributed a .03 change in R Squared (.22) compared to the .14 change contributed by the physical health variables. The physical health contribution approached significance. The data for all the subsets are presented in Table 17.

Reactivity Dependent Measures

Multiple regression analyses were performed separately on the dependent or predicted measures; systolic reactivity, diastolic reactivity and heart rate reactivity. When all of the independent variables were entered in the equation, 31% of the variance in systolic reactivity was accounted for. The data for the regression equation are presented in Table 18. A multiple regression equation was conducted on diastolic reactivity as the dependent variable and all of the independent or

predictor variables accounted for 32% of the variance. Heart rate reactivity also served as a dependent measure and all of the independent variables accounted for 50% of the variance in the equation. None of the F values for the three regression equations was significantly different from zero.

[Insert Table 18 Here]

Testing Subsets

Two subsets of independent variables were tested for their contribution to R Squared for the systolic reactivity dependent measure. The psychological variables subset which changed R Squared by .01, included the anger-out scale and the passive scale. The physical variables contributed .04 to the change in R Squared. The data for these subsets are presented in Table 19.

The psychological subset tested for the diastolic reactivity measure included The Rathus and passive assertiveness scales. A change of .07 occurred in R Squared when this subset was removed from the equation compared to a .02 change attributed to the physical variable subset.

The psychological subset tested for change in R Squared for heart rate reactivity included the Rathus , anger-in and hostile scales. The change in R Squared when this subset was removed from the equation was .18

with [F,(3,4), 3.59, p < .02]. The physical variables contributed .09 to the equation.

[Insert Table 19 Here]

CHAPTER V

DISCUSSION

Cardiovascular Reactivity

One investigative focus in this study was on cardiovascular change during stressful experimental procedures. Overall, the results of this study are consistent with previous findings concerning blood pressure and heart rate changes over stressful laboratory conditions (Morrison, et al., 1985; Smith, et al., 1989). As predicted, subjects exhibited greater blood pressure and heart rate levels during the task performance than while resting or completing the questionnaires. As expected, blood pressure and heart rate levels peaked during actual task performance. Because the task required subjects to role play two social influence attempts, this result could simply be a function of talking (Lynch, 1985). However, systolic and diastolic blood pressure and heart rate measures during the task anticipation period differed significantly from their respective baseline measures. These results support previous findings that heightened reactivity occurs not only when subjects speak, but also when they anticipate a speech related task, particulary if they are preparing an attempt to influence another person (Smith, Allred, Morrison & Carlson, 1989).

Research has shown that one determinant of the

magnitude of cardiovascular reactivity elicited by stressors involves how much subjects must actively cope with the lab stressor rather than simply tolerate stressful circumstances (Obrist, et al., 1978). Because the present procedure did not control for other arousing task features, the magnitude of the reactivity during the task anticipation and performance periods cannot be solely attributed to subjects' active coping with the social influence attempts. This heightened reactivity could also be due to evaluation apprehension and talking respectively (Smith et al., 1989).

As seen in previous studies, systolic blood pressure evidenced the most dramatic changes over the 6 trial periods with the greatest change from baseline occurring during the task performance trial (M=40mmHg). The mean change in diastolic blood pressure from baseline to the task performance was a relatively smaller 19 mmHg. The greatest difference between average heart rates over trials was 14 beats per minute and occurred between the baseline and task performance periods. Although blood pressure and heart rate levels exhibited the expected trend toward baseline after the task performance, only heart rate activity exhibited a complete recovery.

An alternative means of assessing cardiovascular reactivity in this study was to calculate change scores for the SBP, DBP, and HR stressor periods. These three

change scores for each physiological variable are the differences in mean values between the baseline and pre-task period (anticipation), the pre-task and performance period (performance), and the performance and the post-task interval (recovery). The hypothesis that the reactivity scores would differ from one another was supported.

As in previous studies (Jorgensen & Houston, 1986; Manuck, Corse & Winkelman, 1978) systolic blood pressure changes were greater than diastolic blood pressure and heart rate changes. For each of the three reactivity scores calculated, the minimum mean systolic blood pressure change was 15 mmHg. The greatest mean change in DBP occurred between the anticipation and task performance trials and was almost 11 mmHg. Although less than the systolic reactivity, this is a considerable change in DBP as these values usually occur when the change score is calculated between baseline and the actual task performance values (Manuck, et al., 1978). Heart rate change scores were also slightly higher than those reported in other studies (Wright, Contrada & Patane, 1986). Recovery scores (post-stressor intervals) for SBP, DBP, and HR were all significantly different from their respective task period measures. This indicated the expected trend toward baseline for each physiological measure once the stressful task had been

completed. This information about mean changes and calculated change scores is presented as evidence for the effectiveness of the stressor manipulation used in this study for eliciting cardiovascular responses.

Cardiovascular Changes and Assertiveness

A second focus of this study concerned the relationship of blood pressure and heart rate reactivity to personality and behavioral traits. It was hypothesized (Obrist, Langer, Grignolo, Light, Hastrup, McCubbin, Koepke & Pollack, 1983) that excessive sympathetic drive on the heart in the form of cardiovascular reactivity to environmental stressors is one of the early events in the etiology of hypertension. This cardiovascular responsiveness is harmful because it provides the body with more cardiac output than is metabolically required (Obrist et al., 1983). In everyday social situations, it is impossible to assess the magnitude and duration of this cardiovascular reactivity. Psychological factors related to this physiological responding to stress may, indeed, be important markers for identifying young adults at risk for developing hypertension.

Assertiveness, in particular, was selected for study because of a growing body of evidence that its extreme social manifestations are associated with established hypertension (Morrison, Bellack & Manuck, 1985).

Hypertensive individuals often have difficulty with assertiveness which may in turn lead to ineffective anger management (Rosenman, 1985). Impaired anger management has been implicated as a risk factor for hypertension (Baer, et al., 1973). In this study, it was hypothesized that subjects categorized as hostile or passive according to the Social Scenario Assertiveness Scale would exhibit significantly higher heart rate and blood pressure levels during the stressor intervals than those subjects classified as appropriately assertive. This hypothesis was not supported. In fact, when baseline readings for the 3 SSAS groups were investigated, the appropriately assertive group exhibited higher baseline measures than the hostile and passive groups.

Although the curvilinear relationship was not supported, a number of significant linear relationships did emerge between the reactivity measures and self-reports of assertiveness. Assertiveness as measured by the Rathus scale and passive and hostile social tendencies as measured by the SSAS, were more strongly correlated to the reactivity measures than the other psychological variables. Specifically, a negative correlation between the Rathus assertiveness scale and diastolic reactivity was found in this study. This relation only approached significance but indicated that as assertiveness levels decreased in social situations,

diastolic reactivity increased. On the other hand, a significant positive correlation existed between the Rathus assertiveness measure and heart rate reactivity. As assertiveness decreased, heart rate reactivity increased.

Similarly, it was also found that the more passive social behaviors subjects reported on the SSAS scale, the greater their systolic reactivity while under social stress. Passive tendencies were also correlated with diastolic reactivity but this relationship only approached significance. These significant correlations provide support for one aspect of the hypothesized relationship between assertiveness and cardiovascular reactivity. Those individuals who report submissive tendencies in conflict situations also exhibited heightened cardiovascular reactivity. This relationship is representative of those people who lack the appropriate social skills that would allow them to deal more effectively with interpersonal problem situations. Whether assertion training that would allow this population to acquire better coping skills would simultaneously lead to a reduction in cardiovascular reactivity remains to be explored.

A positive significant correlation was found between the SSAS hostility measure and heart rate reactivity. This result lends support to the hypothesis that hostile

social tendencies are related to cardiovascular reactivity. This relationship is representative of people who overreact both socially and physically to situations that are potentially conflictive in nature. It has been suggested that people with this assertion problem would probably benefit from acquiring relaxation strategies that would enable them to respond in a more socially appropriate, less hostile way (Manuck, et al., 1985).

Cardiovascular Changes and Family History

Another trait under investigation was family history of hypertension. When the stress-related cardiovascular responses of subjects with or without a family history of hypertension were contrasted, it was hypothesized that the children of hypertensive parents would exhibit significantly greater blood pressure and heart rate reactivity. This hypothesis was not supported by the analysis of variance done on the blood pressure and heart rate trial means but was partially supported by the significant family history by systolic change scores interaction. Children of hypertensive parents exhibited significantly higher task anticipation SBP than subjects with no family history of hypertension. Jorgensen and Houston (1986) reported similar findings. One unexpected result was that subjects with no family history of

hypertension exhibited significantly greater systolic reactivity than the positive family history group during the task performance interval. Systolic recovery scores did not differ between the two groups. Reactivity measures of HR and DBP revealed no significant differences between positive and negative family history groups. Similar findings of no HR or DBP reactivity effects have been reported in previous research on the relationship between cardiovascular responsivity and family history of hypertension (Manuck, Giordani, McQuaid & Garrity, 1981).

Psychological and Biophysical Predictors

Few previous studies have used multiple regression analyses to explore the contributions of psychosocial and biophysical variables to the variance in resting and reactive cardiovascular states. According to the regression analyses, the strongest predictor of cardiovascular baseline measures in this study was subjects' weight. Whether subjects smoked cigarettes or not was also a strong predictor of diastolic and heart rate baseline measures. The findings that biophysical variables are strong predictors of resting blood pressure support previous research (Stamler, 1975). When subsets of psychological and physical variables were compared to one another for predictive power, the subset

including weight, exercise, smoking and family history were accounted for more variance in cardiovascular baseline variables than the psychological variables.

When compared to subsets of biophysical variables, the psychological variables were stronger predictors of diastolic and heart rate reactivity. The subset of psychological variables tested in the heart rate reactivity regression equation accounted for a significant amount of the variance in the equation. In this study, health related variables were related to resting blood pressure and the psychological variables were related to cardiovascular reactivity. This finding is one that requires further investigation before any conclusions may be drawn.

Sex Differences

No significant sex differences were found in this study. Baseline and reactivity measures for men and women, although different, did not reach statistical significance. A meta-analysis conducted on the current literature on sex differences in physiological reactivity (Stoney, Davis & Matthews, 1987) found that men have higher resting blood pressure than do women but women exhibit higher resting heart rates. This trend was also found in the present study. Stoney et al. (1987) also found support for the hypothesis that men exhibit greater

overall cardiovascular reactivity than do women. A similar trend was found in this study.

Methodological Considerations

Although the stressor task used in this study elicited large cardiovascular changes, there were small correlations between the psychological predictors and the reactivity measures. This study included a number of novel methodological features that provided assets and liabilities. These features, particularly the new technology and social stressor task, potentially had an impact on the results of the study. The stressor manipulation elicited large changes in subjects' cardiovascular arousal and the new measurement technology was immediately sensitive to these changes. However, direct comparison of the results in this study to past research is now more difficult.

The finapres allows for the continuous monitoring of subjects' blood pressure and heart rate. This instrument can detect cardiovascular changes as they occur. The finapres, however, measures blood pressure through the changes in the attached finger's arterial volume. Cardiovascular reactivity in other studies is usually assessed by instruments involving a blood pressure cuff and pulse microphone that detects Karotkoff sounds in the brachial artery of the nondominant arm. The differences

between the reactivity detection capabilities by either methodology is not yet known. For this reason, it is difficult to directly compare the cardiovascular reactivity to stress in this study to changes found in other studies. Specifically, the blood pressure changes detected by the finapres may be more influenced by peripheral vasoconstriction than blood pressure changes detected by an arm cuff.

The role play stressor developed for this study also has mixed implication for this research project. It was advantageous to have subjects role play to a camera. No trained confederate was necessary and there was no opportunity for a highly artificial interaction between a confederate and a subject. The social stressor also provided a vehicle for the assessment of assertiveness under both positive and negative circumstances. The problem with the social stressor is that it elicited substantial cardiovascular changes in most subjects. This will make it difficult to differentiate between high and low reactors in this study. The stressor task will require fine-tuning and within subject comparison to reactivity elicited by a more traditional laboratory stressor task, such as mental arithmetic. Until the limitations concerning the finapres and the social stressor task are resolved, it is difficult to make direct comparisons of the results in this study to those

found in other cardiovascular reactivity research.

Another limitation with this study concerns the use of the Social Scenario Assertiveness Scale as a means of grouping subjects into passive, assertive or hostile groups. The lack of support for the curvilinear hypothesis may, in part, be due to the assertiveness measurement scale. The SSAS was designed for this study and although its reliability is above average, its validity is unknown. In the future, subjects' responses on the SSAS will be compared to objective behavioral ratings before such grouping is used in the statistical analyses.

To further explore the potential curvilinear relationship, additional analyses were conducted using high, average and low scores on the Rathus assertiveness scale as grouping factors. Once again, the hypothesis that high and low levels of assertiveness would be associated with increase cardiovascular reactivity was not supported. Although Morrison et al. (1985) found a curvilinear relationship between assertiveness tendencies and cardiovascular arousal, they used a different assessment of assertiveness and reactivity. Subjects' assertiveness was based on objective ratings of their role-play behaviors. No self-report measures of assertiveness were involved in the assessment. Although the SSAS was designed to be a more sensitive self-report

measure of assertiveness, until it is assessed against actual behaviors, it weaknesses won't be known.

Another methodological feature that might have influenced the findings of this study and also make direct comparison to past research difficult is that both male and female subjects were used. In most cardiovascular reactivity research, only male subjects are used. Although no significant differences were found between male and female baseline blood pressure or overall cardiovascular reactivity measures, there were trends in the data that suggest differences do exist. If more subjects were run, these differences may have been noticeable. The results of this and past studies cannot be generalized to a female population because factors (i.e., menstrual cycle, body mass) affecting physiological parameters must be statistically controlled for before making meaningful comparisons (Stoney et al., 1987). Also, differences may exist between male and female response tendencies on the assertiveness and anger-expression measures.

Limitations

One limitation of this study concerns the small number of subjects from whom data was collected. This problem subsequently contributed to the low number of subjects who had a family history of hypertension. It may prove

useful, in future studies, to screen subjects before their participation to target those who are children of hypertensive parents. This way, groups representing children of hypertensive parents and those representing children of normotensive parents can be better compared on such personality and behavioral traits as assertiveness and anger expression and their relation to cardiovascular reactivity.

The small number of subjects with a family history of hypertension may have also contributed to the lack of support for the relationship between assertiveness and cardiovascular reactivity. In studies that have found such a relationship (Morrison, Bellack & Manuck, 1985) subjects have come from both established and borderline hypertensive populations. It may be that this relationship exists but is not evident in a normotensive college age population.

Future Research Directions

Other data already collected during this study may be used in future research projects. For example, subjects were asked to rate their own video taped role-play performances in terms of how socially persuasive they thought they had been. Subjects were also asked to provide self-perceptions of social assertiveness. The video tapes of the actual attempts at social influence

are also available. One investigation of this data may involve the relationship between subjects' self-perceptions of their performance, self-perceptions of their social assertiveness, and their cardiovascular reactivity.

In addition, objective ratings of the video-taped speeches may also be investigated. The relationship between subjects' perceptions of their social influence attempts and raters evaluations of their attempts may provide useful questions for future research. A content analysis of the videotapes is another possible research direction. The way in which people attempt to avoid negative circumstances (the shoplifting role-play) or attain a positive outcome (the scholarship role-play) may be related to cardiovascular arousal.

In future research projects, I also intend to pursue questions involving differences in cardiovascular responding and coping efforts between men and women. Most of the existing studies on cardiovascular responsivity to stress employ only male subjects. The results of these comparisons may provide important implications for understanding the different mortality rates between men and women with respect to coronary heart disease. It will also be important to use pulse pressure as a measurement of cardiovascular reactivity for the direct comparison of results to other studies.

Conclusion

It has been suggested that medical research should focus on motivating people to change their lifestyles as a crucial step in preventing health disorders (Hamburg, Elliot & Parron, 1982). The first necessary accomplishment, however, would be identifying behavioral and personality traits which are risk factors for a disease and then determining if their change would provide a health benefit (Hamburg, et al., 1982). It was the purpose of the present study to assess the relationships between personality and behavioral characteristics associated with hypertension. "The clinical value of further research on hypertension may be demonstrated if variables can be identified, particularly psychosocial variables, which increase significantly the amount of variance accounted for in resting measures and cardiovascular arousal" (Linden, 1984).

With the above goals in mind, it would be worthwhile to pursue research which involves self-report and behavioral measures of assertiveness and anger-expression to assess their predictive contributions to the constellation of symptoms that are considered to be risk factors for the development of hypertension. The results from the regression analyses in this study were not powerful, but considering that one subset of

psychological variables accounted for a significant amount of the variance in heart rate reactivity, the potential implications require further investigation.

It is important to continue to use a college-aged population for the present line of research. The information derived from studies using such a population could be generalized to the young adult population at large. As psychological and behavioral predictors of hypertension are identified, those who may be unaware of their own risk for the onset of this condition may benefit from early preventative measures rather than from later medical treatment.

Footnotes

1 These are planned comparisons. There is some division of opinion about the most appropriate error term for t-tests on levels of a within subjects design. This analysis follows recommendations of Myers (1979) and uses the Bonferroni correction for inflated risk of Type I error. For each set of 5 tests on a particular dependent variable, the EW alpha is set to .05; the PW alpha is set to alpha/5 = .01.

2 There is some controversy about the appropriateness of calculating such gain scores (Benjamin, 1967) but for the purpose of allowing a more direct comaprison of results to those from previos studies, absolute differences between measures represents cardiovascular reactivity in this study.

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APPENDIX

APPENDIX A

Informed Consent

Dear Participant,

I am asking you to participate in a study which will require your involvement only once. During this session I will ask you to complete several surveys and I will also record your blood pressure and heart rate. all of the information you provide will be anonymous as you will be identified by a code number, not your name. A complete debriefing will be provided at the end of the experimental session.

Thank you for your participation.

Kim Mooney

Department of Psychology

1. I understand that this research project has been approved by the University Internal Review Board on Ethics and it has authorized the use of human subjects in this study.

2. I understand that the confidentiality of all data associated with my participation in this research, including my identity, will be fully maintained within the extent of the law.

3. I understand that I have the right to ask questions about this reseach, related topics, and my participation in it and to have such questions answered by the researchers.

4. I understand that my consent to participate in this research is voluntary and that my refusal to participate will have no effect on me.

Date_____ Signature_____

APPENDIX B

Task Instructions

The following two scenarios and instructions were given in random order to each subject. The subjects were advised to spend approximately 5 minutes working on each scenario as they had a total of 10 minutes to complete the task. Each subjects was asked to prepare a response in the form of a speech that would last 2 minutes.

To Subjects: Imagine yourself in this situation:

During a hectic day you stop in a local drug store to pick up a few necessities. While there, you meet a friend who is on the way out of the store. As you are talking, without thinking, you start to leave the store without having paid for the items. You realize this just in time to to turn around and bump into the security guard who starts leading you to the manager's office. The store manager accuses you of shoplifting and intends to call the police.

Instructions: Imagine that you are now standing in front of the store manager with an opportunity to convince him/her why you walking out of the store with the items and why he/she shouldn't call the police. Outline what you might say to the manager (as you will be `role-playing' this to the video camera).

To Subjects: Imagine yourself in this situation:

A few months ago you applied for a tuition scholarship which is based on service to the Univeristy, financial need, and grades in your major area of study. The scholarship committee has informed you that you are one of the four finalists for this scholarship.

Instructions: Imagine that you are now seated in front of the Scholarship Committee with an opportunity to discuss why you should be the recipient of the tuition scholarship. Outline what you might say to the committee (as you wil be `role-playing' this to the video camera).

APPENDIX C

Family History Questionnaire

The following questions ask about the health history of your BIOLOGICAL parents. If your present parents are adoptive or stepparents, then you may not know the health history of your biological parents. If this is the case, please just indicate "not certain."

1. Has your biological father ever been diagnosed as having high blood pressure (hypertension)?

   a. yes

   b. no

   c. not certain

2. Has your biological mother ever been diagnosed as having high blood pressure (hypertension)?

   a. yes

   b. no

   c. not certain

3. Have you ever been diagnosed as having high blood pressure?

   a. yes

   b. no

   c. not certain

Table 1

Original Scenarios Provided for Response to the Question: What would you do?

1. You are waiting in a "10 Items or Less/Cash Only" line at the grocery store. It is a long line and it is moving very slowly. You notice that the person in front of you not only has at least 15 items but is preparing to write out a check.

2. You are driving on a major highway in heavy traffic and another driver cuts in front of you abruptly, frocing you to brake suddenly.

3. You are riding on a nearly empty bus and notice that the person who is sitting in the seat across from you looks like a nice person (same sex as you). It is going to be a long ride and you haven't brought anything to read or to do.

4. You buy a fairly expensive sweater but after wearing it once you notice a hole under the arm. You are not certain it was there when you bought it but it seems possible.

5. At a restaurant that usually has good food, you are served a bowl of chili. The cook has accidentally dropped a match in it and you find it in the spoonful that's on its way to your mouth.

6. Your neighbor plays loud music until very late and the noise disturbs your sleep at least 3 nights a week. One night it is particularly loud and you simply cannot get to sleep at all.

7. For your birthday, a friend has given you the ugliest shirt you have ever seen. You know that there is a shirt of equal value at the same store the gift was bought in that is much more to your liking.

8. You are sitting in a dentist's waiting room and a stranger sits down next to you and begins reading a magazine. He/she suddenly looks up and says "What is that awful smell? Are you wearing cologne or perfume?" You are.

9. You hand in a piece of work that you have been working on for a long time. Your teacher or supervisor hands it back with a negative evaluation and no explanation.

10. You have just met a distant cousin for the first time and after the initial introductions he/she asks you a very personal question on a family matter that makes you uncomfortable.

Table 2

Percentages of Subjects Reporting Similar Experiences to Situations Described in the Pilot Study 1

	Situation	Male	Female
1.	Waiting in line at market	86	77
2.	Cut off while driving	100	97
3.	New clothing has tear	57	74
4.	Find something in food	43	51
5.	Neighbor plays loud music	64	74
*6.	Rude comment by stranger	7	13
7.	Poor evaluation/no explanation	86	90
*8.	Stranger helps find possession	43	31
**9.	Date cancels unexpectedly	57	41
**10.	Friend lies applications	50	41
**11.	Friend constantly late	86	95
**12.	Roomate claims paid you back	50	49
**13.	Car double parks behind you	62	39

*Did not reach criterion and therefore discarded
**Scenarios added after Pilot Study 1

Table 3

The Final Categorization of Behavioral Alternatives Retained for SSAS:
1= overly assertive
2= appropriately assertive
3= unassertive

1. You are waiting in a "10 Items or Less/Cash only" line at the grocery store. It is a long line and it is moving very slowly. You notice that the person in front of you not only has at least 15 items but is preparing to write out a check.

Category Agreement	Final Category	
88%	2	politely ask if you could check out first
56%	1	give the person dirty looks
56%	3	move to another line
95%	3	tell the person off for being inconsiderate
78%	1	put your items down on the belt and walk out
51%	2	point out the "10 items or less" sign
56%	1	speak to the store manager about this
52%	1	say something out loud to the others in line so the person can hear you

2. You are driving on a major highway in heavy traffic and another driver cuts in front of you, forcing you to brake suddenly.

Category Agreement	Final Category	
57%	2	just watch out for other crazy drivers
72%	1	do the same thing to him or her
68%	3	do nothing
54%	1	beep horn and yell derogatory remark
77%	2	take license plate # and report him/her to local police
85%	3	get off the highway

3. You buy an expensive suit for a job interview and on the day of the meeting, you notice a hole under the arm. You are certain it was there when you bought it.

78%	3	throw it out
87%	2	try to mend it
90%	1	tell the retailer the merchandise is cheap and you don't plan to shop there
65%	2	bring it back to the store, demand a new one
81%	3	give it away
74%	3	buy another one to replace it

4. At a restaurant that usually has good food, you are served a bowl of chili. The cook has accidentally dropped a match in it, and you find it in the spoonful that on its way to your mouth.

Category Agreement	Final Category	
77%	2	complain to the management
95%	2	request a fresh serving
93%	3	throw the match away and continue eating
68%	1	demand a free meal
52%	3	do not complain
52%	1	you pass the word along to your friends that the place isn't sanitary

5. Your neighbor plays loud music until very late at night and the noise disturbs your sleep at least 3 nights a week. One night it is particularly loud and you simply cannot get to sleep at all.

57%	3	go to their party
100%	2	call and ask them to turn the music down
100%	3	try to get to sleep and do nothing
85%	1	retaliate the next morning by turning your music up
81%	1	pound on their door and demand they turn the music down
95%	2	mention the problem to them the next time you see them

6. You hand in a paper that you've been working on all semester. You instructor hands it back with a negative evaluation and no explanation.

Category Agreement	Final Category	
95%	2	go and ask to discuss it, for future improvement
95%	2	try to work out a better grade
56%	1	confront the instructor and insist that he/she reconsider the grade given
42%	3	avoid future classes with that instructor
81%	1	tell other students how unfair he/she is as well as being a lousy professor
90%	3	accept the grade as it is and try harder next time

7. Your club is sponsoring a holiday dance and you'd really like to go. You've been attracted to someone and you muster up the nerve to ask him/her. The response is "Yes"! but two hours later, your date calls back and says, "Sorry, but someone else has asked me and I'd really like to go with him/her."

59%	1	tell him/her right off
100%	3	nothing, just feel sorry for yourself
59%	2	you accept that explanation and make other plans for that evening
100%	2	you ask someone else to the dance
61%	1	ignore him/her for a few weeks so he/she can see how it feels
51%	3	pretend that it's OK and just stay home the night of the dance

8. You and a good friend desperately need summer jobs. You go to the local stores and restaurants to pick up a variety of applications. As you are filling them out, you notice that your friend is lying on the applications to make him/herself sound more suitable for the jobs than he/she actually is.

Category Agreement	Final Category	
61%	3	ignore it and fill out your applications
74%	2	confront the friend because your chances for a job are being ruined
95%	1	confront the friend by calling him or her a liar and walking off
87%	1	report the information to the potential employer
81%	3	say nothing about it at all even though it is evident that you've noticed
57%	1	you think it is a good idea and start to do the same
57%	2	say something sarcastic about it

9. You have been waiting all week to attend your school's championship basketball game. It's your friend's turn to drive and he/she calls and says, "I'll pick you up in 5 minutes." An hour later your friend shows up with a feeble excuse. This is not the first time this has happened.

37%	2	shoot him/her a dirty look and get in the car
74%	3	pretend it's fine and hurry there
74%	1	really tell him/her off
78%	1	say nothing now, he/she will pay later
51%	3	say nothing about it at all
95%	2	you are disappointed and say so but decide not to argue

10. You lent your roommate $25 about 2 weeks ago. You ask him/her if you could have it back by this coming weekend. You receive a look of surprise. Your roommate says, "I paid you back last week." You know that is not true.

Category Agreement	Final Category	
95%	2	explain calmly how this is not the case
95%	3	do nothing, just accept the response
90%	1	confront this person as a liar and prepare to move
57%	2	wait another day or two and ask again
100%	3	do nothing, even though you don't believe it
87%	1	tell others on the dorm floor that your roommate is not to be trusted

11. You are at work but expected at the doctor's office very soon. When you go to the parking lot you find another car is blocking yours in. After a few minutes, the driver of the car returns, jumps in and starts the engine without even glancing at you.

74%	1	yell a few obscenities at the car
89%	2	tap on the person's window to tell him/her how you have been inconvenienced
83%	3	do nothing
70%	1	leave a nasty note on the windshield before the person returns
81%	2	leave a polite note on the windshield explaining the inconvenience
51%	3	you just wait in your car until the person returns and hurry to the doctor's

Table 4

Reliability Coefficients for the Psychological Scales

Scale	Alpha Coefficient
Rathus Assertiveness	.71
Marlowe-Crowne Social Desirability	.60
Anger-In	.66
Anger-out	.66
Social Scenario Assertiveness	.68

Table 5

Intercorrelations Among Psychological Variables

	Anger-In	Anger-Out	Social Desirability	SSAS Passive	SSAS Hostile
Rathus	-.38***	.29**	.06	-.10	-.13
Anger In		-.01	-.22*	-.12	.08
Anger Out			-.20*	-.07	.21*
Social Desirability				.10	-.28*
SSAS Passive					-.37***

*p < .05
**p < .01
***p < .001

Table 6

Means for Systolic and Diastolic Blood Pressure and Heart Rate for the Six Experimental Sessions

Trial	Mean	S. D.
Systolic (mmHg)		
1	125.36	19.73
2	138.76	20.41
3	145.43	19.32
4	163.98	22.02
5	148.73	19.69
6	139.37	18.99
Diastolic (mmHg)		
1	74.14	11.71
2	79.46	11.05
3	82.75	12.20
4	93.37	13.48
5	85.25	14.21
6	79.63	12.21
Heart Rate (bpm)		
1	74.44	8.63
2	80.41	9.56
3	82.44	9.90
4	88.18	11.86
5	78.52	14.39
6	73.53	8.90

TABLE 7

Repeated Measures ANOVA: Blood Pressure and Heart Rate

Within Subjects Factor	Multivariate F	p	Univariate F	p
Systolic	58.03	<.001	106.77	<.001
Diastolic	52.97	<.001	76.59	<.001
Heart Rate	44.34	<.001	33.84	<.001

Multivariate DF (5,59); Univariate DF (5,315).

TABLE 8

Paired T-Test Results: Baseline Compared to All Trials

Trials	Differences Between Means	t values
Systolic		
2 - 1	13.40	9.28*
3 - 1	20.06	11.05*
4 - 1	38.61	16.95
5 - 1	23.36	12.39*
6 - 1	13.50	7.72*
Diastolic		
2 - 1	5.32	8.66*
3 - 1	8.60	8.66*
4 - 1	19.23	15.81*
5 - 1	11.10	8.85*
6 - 1	5.44	5.37*
Heart Rate		
2 - 1	5.96	6.93*
3 - 1	8.00	11.85*
4 - 1	13.73	12.76*
5 - 1	4.07	2.36
6 - 1	.85	1.35

*Difference significant at $p < .01$.

Table 9

Baseline Values for Sex, Assertiveness and Family History of Hypertension Groups

	Baseline Means					
Factors	Systolic (mmHg)	N	Diastolic (mmHg)	N	Heart Rate (bpm)	N
Sex*						
Male	130.07	28	77.17	28	73.67	28
Female	121.81	37	71.77	36	75.02	37
Assertiveness Groups*						
Passive	123.27	22	73.66	21	72.45	22
Assert.	127.17	23	74.69	23	75.35	23
Hostile	125.36	20	74.14	20	74.46	20
Family History*						
Positive	118.66	15	70.80	15	74.00	15
Negative	125.93	43	74.42	42	74.60	43

*No means significantly differed.

Table 10

Repeated Measures ANOVA: Interaction Effects for Blood Pressure and Heart Rate Trials with Sex, Assertiveness and Family History

	Between Subjects Factors		
Physiological Trials	Sex	Assertiveness	Family History
	F	F	F
Systolic	1.28	1.64	1.14
DF	5,58	10,114	5,51
Diastolic	.97	.98	1.06
DF	5,58	10,112	5,50
Heart Rate	.76	.75	.52
DF	5,58	10,114	5,51

Table 11

Mean Change Scores for Blood Pressure and Heart Rate Trials

	Mean Change Scores		
Trials	Anticipation	Performance	Recovery
Systolic (mmMH)	20.06**	18.55*	- 15.24
Diastolic (mmHG)	8.60	10.62*	- 8.12
Heart Rate (bpm)	8.00	5.73*	- 9.66

*Performance scores for all three physiological measures differed significantly from their respective recovery scores at $p < .02$.
**Systolic anticipation change score was significantly different from recovery change score at $p < .05$.

Table 12

Repeated Measures ANOVA: Blood Pressure and Heart Rate Change Scores

Change Scores	Multivariate F	Multivariate p	Univariate F	Univariate p
Systolic	4.44	<.02	2.99	<.05
Diastolic	3.01	<.05	2.29	ns
HR	3.77	<.05	2.85	<.06

Table 13

Repeated Measures Interaction Effects for Changes Scores and Group Factors

	Between Subjects Factors		
Change Scores	Sex	Assertviveness	Family History
	F	F	F
Systolic	1.01	1.02	3.03
(DF)	2,62	4,124	2,55
Diastolic	.88	.17	1.99
(DF)	2,61	4,120	2,54
HR	1.34	.63	1.02
(DF)	2,62	4,124	2,55

*Interaction significant at $p < .05$.

Table 14

Intercorrelations Among Psychological Measures and Mean Reactivity Measures

	Baseline			Task Reactivity		
	Sys.	Dia.	HR	Sys.	Dia.	HR
Rathus	.13	.02	-.16	-.02	-.20	-.29*
Anger In	-.24*	-.19	.17	-.01	.08	.19
Anger Out	-.15	-.17	-.01	-.11	-.05	-.03
Social Des.	.12	.08	-.01	-.01	.08	.01
Passive SSAS	-.08	-.01	-.13	.24*	.17	.07
Hostile SASS	.01	-.01	.07	-.09	.02	.24*

* p <.05 (2-tail)

Table 15

Intercorrelations Among Biophysical Measures
And Reactivity Measures

	Baseline			Task Reactivity		
	Sys.	Dia.	HR	Sys.	Dia.	HR
Weight	.35**	.29*	-.25*	.07	.01	-.21
Exercise	.09	.06	-.28*	-.03	.15	.04
Smoke	-.03	.08	.15	.17	-.03	.01
FamHist	-.16	-.13	-.03	.01	.03	-.02

*$p < .05$
**$p < .01$

Table 16

Multiple Regression with Baseline Blood Pressure Heart Rate as Dependent Variables

	Dependent Variables		
	Systolic	Diastolic	Heart Rate
Multiple R	.44	.36	.47
R Squared	.19	.13	.22
F	1.23	.73	1.44
Independent Variables	Beta Weights		
Rathus	.0568	-.1032	-.1862
Hostile	-.0111	-.0758	.0890
Passive	-.1155	-.1205	-.1624
Anger-Out	-.1423	-.0769	.0537
Anger-In	-.1067	-.1672	-.1484
Weight	.3414	.2532	-.2613
Exercise	-.1187	-.0921	-.1315
Smoking	-.0092	.1279	.2460
Fam.History	-.1257	.0758	.0363

Table 17

Multiple Regression with Psychological and Biophysical Independent Variable Subsets

	R Squared Change	F
Systolic Baseline		
IV Subsets Tested:		
Rathus Anger-In Anger-Out	.02	.44
Physical Health	.09	1.35
Diastolic Baseline		
IV Subsets Tested:		
Anger-In Anger-Out	.02	.62
Physical Health	.06	.75
Heart Rate Baseline		
IV Subsets Tested:		
Rathus Anger-In Passive	.03	.56
Physical Health	.14	2.09

Table 18

Multiple Regression with Change Scores as Dependent Variables

	Dependent Measures		
	Systolic	Diastolic	Heart Rate
Multiple R	.31	.32	.50
R Squared	.09	.10	.25
F	.53	.56	1.67
Independent Variables	Beta Weights		
Rathus	-.1073	-.3400	-.2892
Hostile	.0503	.0077	.3281
Passive	.1432	-.0509	.1423
Anger-Out	-.0175	.0568	.0172
Anger-In	-.1067	-.1649	.0473
Weight	.0610	.0254	-.2056
Exercise	.0116	-.0676	.2757
Smoking	.2451	.1203	.0894
Fam. History	-.0016	.0648	-.0817

Table 19

Multiple Regression with Psychological and Biophysical Independent Variable Subsets

	R Squared Change	F
Systolic Reactivity		
IV Subsets Tested:		
Anger-Out Passive	.01	.33
Physical Health	.04	.55
Diastolic Reactivity		
IV Subsets Tested:		
Rathus Passive	.07	1.67
Physical Health	.02	.23
Heart Rate Reactivity		
IV Subsets Tested:		
Rathus Anger-In Hostile	.18	3.59*
Physical Health	.09	1.38

* $p < .02$