

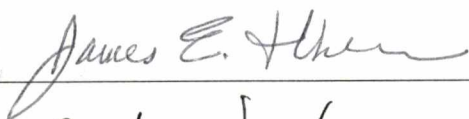
To the Graduate Council:

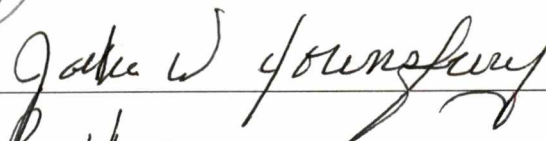
I am submitting herewith a dissertation written by Cheryl Abdulrahman Armstead entitled "The Relationship Between Control, Hostility, Anger Suppression and Cardiovascular Responsivity to Racial and Other Stressors Among Black and White Women." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy with a major in psychology.

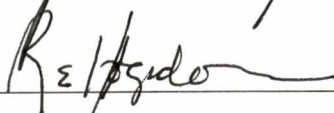


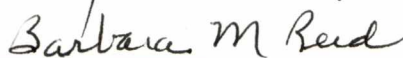
Kathleen A. Lawler, Major Professor

We have read this dissertation
and recommend its acceptance:









Accepted for the Council:



Associate Vice Chancellor
and Dean of the Graduate School

**THE RELATIONSHIP BETWEEN
CONTROL, HOSTILITY, ANGER SUPPRESSION
AND CARDIOVASCULAR RESPONSIVITY
TO RACIAL AND OTHER STRESSORS
AMONG BLACK AND WHITE WOMEN**

A Dissertation Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Cheryl Abdulrahman Armstead

May 1991

DEDICATION

To my mother and father, Mr. and Mrs. Earl Armstead, whose sacrifices, nurturance, and support gave me the fortitude to complete my education. To Soliman Abdulrahman, my husband, whose patience, quiet assurance, love, and sacrifices enabled me to successfully finish this dissertation.

ACKNOWLEDGEMENTS

Research is a cooperative endeavor; therefore, I would like to thank a number of individuals who were instrumental in the success of this project. My committee members provided assistance well beyond that which is traditionally expected. In particular, Dr. Kathleen Lawler, my committee chairperson, has served as an academic advisor, mentor and source of fortitude. She spent many hours encouraging the development of this research, fine tuning methodological and statistical considerations and providing editorial comments for this manuscript. Her kindness and direction have enabled me to pursue many of the research and future career goals that I have long desired. There are not enough words of appreciation to express all that Dr. Lawler has done for me. Additionally, Dr. James Lawler has provided invaluable assistance to me concerning the hemodynamic data. His expertise in physiology were instrumental in the interpretation of this data. Dr. John Lounsbury provided statistical focus and structure to my research. His comments and questions helped to delineate and tailor my analyses to the project data. The suggestions and comments of Dr. Ronald Hopson and Dr. Barbara Reid both provided invaluable assistance.

Special thanks in the recruitment of subjects, interviewing and collection of data goes to Michelle Haga, Nancy Puckett, Elizabeth Copeland and Richard Givens, Jack Crouch and Gwynetta Draper. Thanks

to the rest of my research assistants, Megan, Jock, Stephani, and Pat for helping us organize the data. I couldn't have finished this without them.

Special thanks also goes to Micheal O'Neil at the University of Tennessee Computing Center for creating a file that enabled me to exchange data between the NCCOM3 and the computer. I would still be inputting data if it hadn't been for Mike. I wish to also express special thanks to Dr. Julie Williams whose periodic calls and concern have helped me get through this time in my academic career. You have truly been a role model. I would like to thank Dr. Debra Baldwin, Dr. Arie Nettles and Sharon Fitzgerald for their support. Many thanks to Anne Lacava, the dissertation coordinator. You are really special.

I would also like to thank some of my colleagues who have provided encouragement and suggestions. In particular, Tina Harralson's concern and help have been invaluable. Thanks also to Gail Romer and Pat Hinton. Your interest and concern were important to me.

I would like to thank my husband, Soliman, who endured my many moods, my late night writing marathons and my housekeeping. His support allowed me to concentrate with singularity of purpose on this project. To my family, I would like to express sincere thanks. I've always had support and love when it was needed. Special thanks go to Jacqueline and James Edwards for their support and encouragement. I would particularly like to thank my parents, Mary and Earl Armstead for their many sacrifices and endless support.

ABSTRACT

Current research has failed to consider the effects of racism as a stress factor that may contribute to the higher incidence of essential hypertension among Blacks. Chronic exposure to racism may result in feelings of powerlessness, hostility and anger suppression. These forms of emotional expression have been found to be related to elevated blood pressure and increased responsivity. The responsivity of sixty eight Black and White women was compared for racist and other stressors.

Blacks demonstrated a greater pressor responsivity to a film stimulus depicting racism, than to neutral and anger provoking film stimuli. This pressor response was accompanied by a concomitant alpha-adrenergic response, which failed to show any indication of cardiac responding (cardiac output did not change from baseline levels). Blood pressure responses among the Blacks are thought to resemble those of essential hypertensives in that they represent a lack of reciprocation between cardiac and vascular responses. This scene may have produced a greater response than the equally emotional anger scene, because depicted racism may be a more emotionally salient stressor than mere depictions of anger among Blacks.

Whites responded to the racist film scene with a mixture of beta and alpha-adrenergic responsivity to the racist film scene. Responses to the racist scene and the anger scene were similar for Whites, but not for Blacks.

Whites demonstrated increased total peripheral resistance and decreased cardiac output during the racist scene from baseline levels. This type of responding represents a normal reciprocal relationship between total peripheral resistance and cardiac output during passive coping tasks.

The video game challenge was thought to represent a traditional active coping stressor for both Whites and Blacks. Blacks responded to this stressor with a mixed beta/alpha-adrenergic type response. Total peripheral resistance, heart rate, systolic, diastolic and mean arterial blood pressure increased maximally, while cardiac output also increased minimally. There was little decoupling between beta and alpha-adrenergic responses during this stressor among Blacks. Among Whites, total peripheral resistance increased, while cardiac output failed to increase from baseline. Heart rate increased and systolic, diastolic and mean arterial pressure increased.

White subjects showed a response to the video challenge that was similar to those seen during passive coping, while Blacks showed a more response pattern that was more similar to active coping. This was attributed to the amount of control that the subjects appeared to demonstrate during the task. Whites appeared to feel frustration and expressed concern over an ability to compete which is a frequent response to a situation in which subjects feel lack of control.

The interview was included in the study to: 1) assess cognitive reactions to discrimination among White and Black women, 2) examine the

relationship of interpersonal stressors to blood pressure and the other hemodynamic variables. Blacks were more likely to attribute discrimination to racism than were Whites. Whites were more likely to attribute discrimination to sexism. There was a small group of Blacks that experienced both racism and sexism, yet there were no White subjects that experienced racism. Blood pressure was related to only one affective trait. Among White females, hostility felt toward males as a result of gender discrimination was positively correlated to diastolic and mean arterial pressures taken during the interview. This was not found among Blacks. Systolic, diastolic and mean arterial pressure during the interview increased from baseline for both Blacks and Whites. Blacks responded to the interview with vascular dominance which was decoupled from cardiac influence. They displayed large increases in total peripheral resistance with little cardiac output or heart rate increase. Whites had a small nonsignificant increase in total peripheral resistance with a concomitant increase in cardiac output and heart rate. Whites appear to have responded to the interview with a reciprocation between alpha and beta-adrenergic systems.

Personality measures were found to be related to blood pressure. For Blacks, increased failure to discuss anger was associated with higher blood pressure during the racist scene. Anger suppression was related to both increased resting diastolic and systolic pressure. Anger styles that involved outwardly directed anger were associated with blood pressure.

among Whites. Increased outwardly directed anger among Whites was strongly related to higher blood pressure levels. Thus, affective coping was different for Blacks and Whites. Spielberger, Johnson, Russell, Crane, Jacobs, and Worden, (1985) believe that the relationship of anger expression to blood pressure is based on a U-shaped curve with extreme anger out and extreme anger suppression related to higher levels of pressure. Alpha-adrenergic responses to racism and suppressed anger may play a role in the pathogenesis of hypertension among Blacks, while Beta-adrenergic responsivity, hostility and outwardly directed anger may play a role in the pathogenesis of hypertension among Whites.

TABLE OF CONTENTS

CHAPTER	PAGE
1. THE EPIDEMIOLOGY OF BLACK/WHITE DIFFERENCES IN BLOOD PRESSURE.....	1
2. PSYCHOSOCIAL FACTORS RELATED TO HYPERTENSION AND RACIAL OPPRESSION.....	10
3. INDIVIDUAL DIFFERENCES.....	15
Vigilance, Coping and Perception of Control...	15
Anger Expression.....	23
Background.....	24
4. HEMODYNAMICS OF ANGER AND HOSTILITY.....	32
5. PURPOSE AND RESEARCH QUESTIONS.....	41
6. METHOD.....	45
Subjects.....	45
Apparatus.....	46
Physiological Recording.....	53
Procedure.....	54
Hemodynamic Data Transformation.....	56
Formulas.....	57
Physiological Data Transformation.....	58
7. BIBLIOGRAPHY.....	60
8. DISCUSSION.....	96
LIST OF REFERENCES.....	125
APPENDICES.....	140
Appendix 1 Materials Used in the Methods.....	141
Appendix 2 Script File.....	154
Appendix 3 Figures.....	156
VITA.....	166

LIST OF TABLES

TABLE	PAGE
1. MEANS AND STANDARD DEVIATIONS FOR DEMOGRAPHIC VARIABLES BY RACE.....	61
2. PEARSON CORRELATIONS AND P-VALUES FOR MOOD AND BLOOD PRESSURE.....	75
3. SUMMARY OF PHYSIOLOGICAL MEASURES OF RESPONSIVITY.....	82
4. PEARSON CORRELATIONS AND P-VALUES FOR ANGER VARIABLES AND BLOOD PRESSURE, WHITES.....	85
5. PEARSON CORRELATIONS AND P-VALUES FOR ANGER MEASURES AND BLOOD PRESSURE, BLACKS.....	87
6. PEARSON CORRELATIONS AND P-VALUES FOR ISOLATION MEASURES AND BLOOD PRESSURE.....	93

LIST OF FIGURES

FIGURE	PAGE
1. SYSTOLIC PRESSURE BY CONDITIONS.....	157
2. DIASTOLIC PRESSURE BY CONDITIONS.....	158
3. MEAN ARTERIAL PRESSURE BY CONDITIONS.....	159
4. TOTAL PERIPHERAL RESISTANCE BY CONDITIONS.....	160
5. CARDIAC INDEX BY CONDITIONS.....	161
6. STROKE VOLUME BY CONDITIONS.....	162
7. HEART RATE BY CONDITIONS.....	163
8. CARDIAC INDEX AND PERIPHERAL RESISTANCE Black Subjects.....	164
9. CARDIAC INDEX AND PERIPHERAL RESISTANCE White subjects.....	165

CHAPTER I

THE EPIDEMIOLOGY OF BLACK/WHITE DIFFERENCES IN BLOOD PRESSURE

Hypertension or elevated blood pressure is a chronic condition that increases the risk of circulatory diseases, particularly heart disease and stroke (U.S. Department of Health & Human Services, 1986) and increases the risk of end stage renal disease (Burton and Hirschman, 1979). There is an extremely high prevalence of hypertension among Black populations of the United States. For White males, between the years 1979 through 1981, the excess mortality from hypertensive diseases was 11.20 per 100,00 population; whereas, for Black males, it was 27.62 per 100,000 population. Similarly, for White women, the excess mortality from hypertensive diseases was 14.52 per 100,00 population; whereas, for Black females, it was 29.32 per 100,000 population. National data show that among adults, ages 18-74 years, the prevalence of hypertension in Blacks is 1.4 times that observed in the White population (National Center for Health Statistics, 1985). From the data, it appears that Black females are equally prone to hypertension and die from it at comparable rates to Black men. A Black female population is very representative of the overall Black population in terms of mortality and morbidity. Subsequently, the experimental use of a Black female population would produce highly generalizable findings. The following review will examine racial and gender differences throughout the epidemiological literature.

In America, the excessive prevalence of Black hypertension has existed since slavery (Kiple and King, 1981). Based on extensive historical accounts, Wilson (1987) proposed that, because most slaves brought to the Americas arrived from the salt-starved interior portion of Africa, individuals who were prone to high levels of salt retention (due to environmental adaptation) were over-represented in the African population. Wilson further suggests that the development of hypertension could be attributed to giving a high salt diet to individuals who already had a predisposition to salt retention.

Hypertension could not be diagnosed during this time because the sphygmomanometer had not been invented. However one can examine and extrapolate information regarding documented symptomology associated with slave death. Severe edema is a symptom of hypertension. Severe cases of edema, which was historically termed dropsy, were documented in many slave holders' property logs as a major cause of death among slaves. Thus, the notion of a high prevalence of hypertension in slave populations is indirectly supported by archival data. In addition to dietary risk for hypertension, it is interesting to note that other risk factors such as oppression, active-coping and goal-blocking were prevalent in the life of the slave.

The first racial differences in blood pressures and morbidity were noted by J.M. Adams, (1932) a New Orleans physician. For all age groups of workmen, both systolic and diastolic blood pressures were higher among Blacks than Whites. A decade later, in a census based study of racial differences in adult citizens of the Virgin Islands, Saunders and Bancroft

(1942) found that Blacks exhibited higher blood pressures than Whites at all age levels. Interestingly, Saunders and Bancroft believed that this higher trend in blood pressure was not due to emotional or mental stress because Blacks were in the majority on this island (Saunders and Bancroft, 1942). However, majority status does not ensure that emotional stress or mental stress due to racism does not occur. This can be noted by the literature concerning apartheid and Black South Africans (Moerdyk, 1983).

Prevalence of hypertension was first confirmed in an epidemiological survey in 1957. In a study performed in Muscogee county, Georgia, Comstock (1957) observed that mean systolic and diastolic blood pressures were higher in Blacks than in Whites, both male and female. There was a general tendency for all mean blood pressures to increase with age. The only age group for which a racial difference was not noted was the 8-14 years age group.

In 1959, Moser performed an epidemiological study of blood pressure in the Bahamas. Blood pressure rose with age and Blacks in all groups demonstrated higher pressures. Johnson and Remington (1961) did further research in the Bahamas that supported Moser's findings. The blood pressure of Blacks was found to be higher than Whites for all age groups. Additionally, Johnson and Remington (1961) compared urban and rural Blacks and high versus low saline concentration in well water. There were no differences in the degree of urbanization or the amount of salt consumed through water or diet. They concluded that urbanization and salt intake could not explain Black/White blood pressure differences. Regional differences have been found in the blood pressures of Americans, with the

coastal Southeast United States possessing some of the greatest Black/White disparities. Exemplary of these regional differences are the findings of the Charleston Heart Study. Pollitzer (1958) examined hospital records, death certificates, and autopsy records of citizens of Charleston, South Carolina. Pollitzer then determined mortality rates associated with cardiovascular disease for Blacks and Whites. Boyle, Griffey, Nichman and Talbert, (1967) summarize the conclusions of the Charleston Heart Study:

- 1) An increase above U.S. figures in arteriosclerotic and hypertensive disease is present among all race-sex groups in Charleston County S.C. by death certificate records.
- 2) The White male has an increased mortality and the Negro male a decreased mortality from arteriosclerotic and/or coronary heart disease as compared with the U.S. average for all males or for the respective races.
- 3) Charleston Negroes of both sexes, but notably Negro females, have an increased mortality for hypertension and cerebral vascular disease, as compared to U.S. White or Negro rates (p. 193).

Examining the relationship between age and blood pressure, Boyle et al. (1967) found that the mean systolic pressure of White males increased with age and White female's pressure paralleled White males until age 60. At the age of 60, White female's systolic pressure increased dramatically; whereas, that of White males continued its gradual increase. This was not true for Blacks. At the age of 50 years, there was a sharp increase in diastolic pressure for both males and females which plateaued and gradually decreased with age. The pressure of Blacks increased some 15 years before that of Whites.

Additionally, Boyle et al. (1967) examined the relationship between blood pressure and anthropologic measures of race. Skin color reflectance

and blood type criteria were used to determine the degree of genotype/phenotype similarity of Charleston Blacks to West African Blacks and Whites. The prevalence of Hgb S, B and Rh₀ blood types in Charleston Blacks were found to be more similar to West African Blacks than U.S. Blacks and Whites concerning group B blood type. Darker skinned Charleston Blacks were found to be most like West Africans regarding group B blood type. Allowing for seasonal differences in color, it was found that there was a significant difference in age adjusted blood pressure in Blacks by skin color. The darker the subject, the higher the diastolic blood pressure. Systolic pressure was not as related to skin color. Harburg, Gleiberman, Roeper, Schork, and Schull (1978) also found that increased blood pressure was related to darker skin color.

McDonough, Garrison, and Hames (1967) also investigated other physiological variables in a sample of Blacks from Evans County Georgia. Despite leaner body mass, lower serum cholesterol levels and lower blood pulse rates than their White counterparts, Blacks in this county displayed higher mean systolic and diastolic blood pressures and greater cardiovascular-related mortality rates. In 1980, Grim, Luft, Miller, Meneely, Battarbee, Hames and Dahl (1980) found that the Blacks failed to show a higher dietary intake of sodium as was previously hypothesized. They write, "The higher blood pressures and higher prevalence of hypertension in Blacks does not appear to be a function of a greater dietary sodium intake in Blacks." Thus, physiology (McDonough, Garrison, and Hames (1967); Grim, Luft, Miller, Meneely, Battarbee, Hames and Dahl, 1980) and genetic inheritance (Boyle et al., 1967) were not solely accountable as risk

factors in the development of hypertension or hypertension-related mortality and disease.

In an attempt to explain the Black/White difference in hypertension in terms of sociological risk factors, McDonough, Garrison, and Hames (1967) examined the relationship of social class to blood pressure. Blacks and Whites (ages 45-74) were divided into high and low social class groups and compared for blood pressure, height, weight by sex, and race. Lower social class Black females showed a higher systolic blood pressure than any other social class group, gender or race ($M = 177.2$ mmHg) followed by high social class Black females ($M = 174.0$ mmHg), high social class Black males ($M = 166.8$ mmHg), and low social class Black males ($M = 164.4$ mmHg). On the whole, Black females exhibited higher systolic blood pressure than White females and Black and White males regardless of social class. For diastolic pressure, Black females in both social groups had pressures comparable to Black males. These measures were a couple of points higher for low social classes. It appears that social class may not explain Black/White differences in blood pressure among males but, it does explain differences among females.

The most comprehensive epidemiologic data are those obtained in the National Health and Nutrition Survey of 1976-1980 [NHANES II], (1986). Earlier surveys include the National Health Examination Survey of 1960-1962 (NHES I), and NHANES I (1971-75) for Health Statistics. NHANES II examined blood pressure levels and trends from 1976 to 1980 in people 18 to 74 years of age.

The NHANES II data show that at ages 18-24 and 25-34 years, mean systolic blood pressure levels for Black men were less than those for White men, though the differences were not significant. However in the age groups 35-44, 45-54, and 55-64 years, mean systolic blood pressure levels were significantly greater in Black men than in White men. Similarly, among women in the age range 35-74 years, systolic blood pressure levels in Black women were higher than those in White women. The same pattern was observed for diastolic blood pressure among both Black men and Women at ages 35-74 years. NHANES I reported regional variations of Blood pressure levels. Mean systolic blood pressure levels were 8-9 mm Hg higher in Black women in the South than in the Midwest or Northeast. No such variations were observed in Black men. No consistent or significant regional pattern was observed for diastolic blood pressure.

Regional differences in hypertensive mortality have been confirmed locally. In the area between Nashville and Memphis Tennessee, Blacks suffered an age-adjusted hypertensive death rate that was significantly higher than the rate among other non-Whites in the United States as a whole (Mason, Fruameni, Hoover and Blot, 1981). In 1986, the age-adjusted death rate for Black males was 3.9 per 100,000 population, while it was 1.5 per 100,000 population for White males (Tennessee Department of Health and Environment: State Center for Health Statistics, 1988). Similarly, the age-adjusted death rate for Black females was 5.0 per 100,000 population, while it was 1.0 per 100,000 population for White females. Similar to the NHANES I study, Southern Black women were most effected by this disease.

Elevated blood pressure levels, defined as systolic blood pressure of at least 160 mm Hg or diastolic pressure of at least 95 mm Hg or both, was detected in 14.5% of all adults, Black and White, ages 25-74 years. Elevated levels were significantly more prevalent among Black than White adults, 22.8% compared to 13.5%. The rates among Black men were not significantly higher than those among Black women.

Definite hypertension, defined as blood pressure in excess of the critical levels given above and/or by the use of antihypertensive medication, was present in 22% of adults ages 25-74 years. There was an excess of definite hypertension in Black adults. The prevalence in Black men (28%) exceeded that in White men (21.2%); that in Black women (39.8%) exceeded that in White women (12.0%). The Black excess was much more marked among women than men and more Black women are being treated than men. Mean systolic and diastolic blood pressure levels were noted to be inversely related to the amount of formal schooling received by examinees in all races and sex groups. Black women above the age of 45 years were significantly more likely to be classified as having definite hypertension than Black men the same age range. The prevalence rate for definite hypertension among Black women, ages 65-74 years, was the highest age-race-sex-specific rate detected: 60.1%.

Given the epidemiological literature, it appears that the Black females, regardless of socioeconomic level and/or residences in high stress areas, are particularly at risk for developing essential hypertension mortality and morbidity as weight and age increase (Boyle et al 1967; NHANES II, 1986). Popular theory posits that the Black male is the main recipient of the

pathogenic effects of hypertension, yet a thorough review of the literature uncovers equivalent and sometimes higher rates of hypertension among Black females. This indicates a genetic similarity between different sexed members of the same race and indicates a basis for a genetic racial difference in predisposition to developing hypertension. Genetics, however can not be the only factor, however. Anderson, Myers, Pickering and Jackson (1989) write, "Clearly, a simple genetic explanation for Black/White differences in the prevalence of hypertension is inadequate." (p.4). The U.S. Department of Health & Human Services. (1986) reports that,

Black in the United States is a sociological category. Some investigators have confused ethnic identity with genetic constitution, simplistically equating them. The heterogeneity of blood pressure levels and hypertension prevalence in Black populations in Africa, the Caribbean, and the Americas casts doubt on the propositions that genetic factors are primarily responsible for the blood pressure excess in U.S. Blacks (p.27.).

Although genetics and other biologically based racial differences may be important factors in explaining Black/White differences in hypertension (Berenson, Voors, and Dalferes, 1979; Luft, Grim, Higgings and Weinberger, 1977), sociological and psychological factors may be of even more importance in explaining individual differences among Blacks. Racial differences may be more comprehensively explained as a synergism between biological, psychosocial and intrapsychic differences in individual response stereotypy. The psychosocial precursors of hypertension among Blacks will be delineated in the following chapter.

CHAPTER 2

PSYCHOSOCIAL RISK FACTORS RELATED TO HYPERTENSION AND RACIAL OPPRESSION

Psychosocial studies seem to point to a differential Black/White typology and incidence of stress (Myers, 1978; Tyroler and James, 1978; James, Lacroix, Kleinbaum and Strogatz, 1984; Thomas and Dobbins, 1986). Myers (1976) proposed that "Blackness" is a stress-inducing stimulus because of negative societal attitudes toward this characteristic. He writes, "Being Black in the United States entails exposure to highly stressful experiences, triggered primarily by the fact of race" (p. 140). Additionally Blacks are seen as having to endure greater amounts of stress than Whites in a variety of interracial settings such as school and work (Fleming, 1981; Shade and Nichols, 1982; Bullock and Houston, 1986). Racism has been described by Blacks as impacting upon economics, Black society and personality (Grier and Cobbs, 1968). In a sociological survey examining discrimination, personality and achievement in northern Blacks, conducted by Crain and Weisman (1972), a little over fifty percent of the Black males in the sample reported that they could recall childhood harrassment by White adults, while thirty percent of the entire Black sample claimed to have been denied a job based on race. Similarly, in The National Women and Stress Survey conducted in 1984 it was found that fifty percent of the Black female respondents reported some degree of racial harrassment in the workplace (Malveaux, 1984). Duh and Willingham (1988) state that, "Black Americans are subjected to stress earlier and sustain it longer than their White counterparts (p. 617)".

Pillay (1984) suggests that social disorganization is the logical outcome of this preponderance of stress within the Black community. Social disorganization has been strongly implicated as a risk factor in stroke mortality among Blacks, but not among Whites (Keil, Tyroler and Boyle, 1977). Between 1956 and 1964, this group of researchers found that for several rural counties in North Carolina, indices of social disorganization such as percentage of incarcerated males, children born out of wedlock, and single parent headed households were strongly related to stroke mortality for both black men and women, especially within the age range of 35-44 years.

Urban life for Blacks in the United States is also stressful. It has been found that among Black males in Detroit, Michigan, skin color is strongly associated with elevated blood pressures, employment in low-status jobs, unemployment and residence in a high stress area (Harburg, Erfurt, Hauenstein, Chape, Schull, Schork, 1973). These high stress areas are similar to what Keil et al (1977) termed as socially disorganized. Unemployment and low pay are often cited as indices of high stress areas.

In the Minnesota Heart Survey, Folsom, Gomez-Marin, Sprafka, Prineas, Edlavitch and Gillum (1985) examined ecologic and cardiovascular risk factors in an urban Black population. Although both systolic and diastolic pressure declined from 1973-74 to 1985, the age-adjusted prevalence of hypertension was 37% for Black males and 38% for Black females. Interestingly, a racially differential yearly income was noted when sampling from the census tracts. For Blacks the average yearly income was \$17,564, but for Whites it was \$28,359. The unemployment rate was 10.6%

and 7.8% respectively for Black men and Black women, while the unemployment rate for White men was 4.3% with White women showing an unemployment rate of 2.9%. About 70% of the Blacks in this sample were high school graduates. Regardless of educational attainments, Blacks were still economically behind and suffered higher rates of hypertension than Whites.

Broman (1989) found that intergenerational social mobility was not associated with decreases in reported hypertension among Blacks. One would hypothesize that socially mobile Blacks would have better access to health care and would practice behaviors that would promote health. One would think that hypertension would decrease with increasing social mobility. Social mobility may act as a form of social disorganization placing mobile Blacks in situations where Black cultural norms and traditions are not accepted. Social mobility among Blacks, may produce a type of social disorganization and anomie similar to that described by Durkheim (1929). The notion that social disorganization lies only in the ghetto may be erroneous. Socioeconomic mobility takes potential leaders from the Black community and transfers them to more integrated communities where they are not wanted or thought of as leaders. The extended family may be no longer a support system among upwardly mobile Blacks. Upwardly mobile Blacks may attempt to "cross the color line" socially and economically. Assimilation may act to dissolve traditions and social support, while promoting control and competition with members of the higher status group.

Cross cultural studies also seem to converge on the finding that social disorganization due to increased contact with an oppressive dominant group

is a risk factor associated with cardiovascular disease related abnormalities. For example, Waldron, Nowotarski, Friemer, Henry, Post and Willen (1982) found that, "blood pressures were higher and the slopes of blood pressure with age were greater in groups which had greater involvements in money, more economic competition and more control by people of different cultures or beliefs and more unfulfilled aspirations.... ." They concluded that the variations between groups appear to be due to differences in amounts of racial oppression.

The idea that increased contact with members of the dominant group may promote hypertension was shown in a study conducted in South Africa comparing the blood pressures of urban and tribal Zulus (Sever, Gordon, Peart and Beighton, 1980). Urban Zulus were found to have higher blood pressures than tribal Africans. It was also found that urban Africans were heavier and ingested more salt than tribal Africans. Aside from dietary differences, increases in blood pressure may be also due to the social environment of apartheid in which the urban Africans were immersed. Increased contact with this system is elemental to urban life in South Africa. In an editorial, Tyroler and James (1978) proposed an explanation of the relationship between race, psychosocial stresses and blood pressure among Blacks:

*Chronic elevations of blood pressure in human populations may be related in part to struggles-- under conditions of great uncertainty- to acquire sufficient economic and social resources to control one's environment;

*These struggles are less intense; or, at least more often rewarded for persons of higher social status;

*In industrialized, male-oriented-and-dominated societies, the struggle for environmental mastery has been led by males;

*In color conscious societies, access to economic and social resources is greatly influenced by one's skin color; (p.2).

Racism has been viewed as a stressor by Aggrey Burke (1982), a British psychiatrist. He believes that racial stress may deleteriously effect the personality and mental health of individuals and is ultimately linked to individual differences in how people react to lack of personal control in an oppressive social situation. One such psychosocial outcome of racial stress is eco-system distrust.

Triandis, Feldman, Weldon and Harvey (1975) provide the following definition of eco-system distrust, "Ecosystem distrust means that most entities in the environment are seen as potentially harmful, and the individual does not see himself as able to improve the situation....Components of the syndrome include less trust for people, suspicion of the motives of others, rejection of authority figures, a lower degree of certainty that particular events will be followed by other events, a sense of individual powerlessness, and a sense that if one is not terribly careful he will get into trouble" (p. 1). The construct of ecological distrust is a global term for what may occur among Blacks during racial stress. This construct encompasses many elements that are associated with cardiovascular reactivity and risk of hypertensive disease (i.e. anger-suppression, powerlessness, external locus of control and cynicism). One of the main issues involved in eco-system distrust is lack of environmental control. Subsequently, we will explore the relevance of powerlessness and its resultant affective states, hostility and anger suppression, as they relate the pathogenesis of hypertensive disease.

CHAPTER 3

INDIVIDUAL DIFFERENCES IN RESPONSES TO RACISM

Even though, many Blacks live in high stress environments, some Blacks encountering this environmental stress do not develop hypertension. The key to explaining this difference may be in comparing differences in behavioral coping styles to stress, between individuals. Control is seen as the basis for coping and affective responding.

Vigilance, Coping and Perception of Control

In the following section racism, as a stressor, will be examined as a function of lack of perceived control, vigilance and active versus passive coping. Racism is seen as a threatening, aversive event with contingencies to be avoided or modified by behavior. Fuerstein, Labbe and Kuczmierczyk (1987) provide a definition "Stressors represent stimulus events requiring some form of adaptation or adjustment. The stress response is a complex reaction pattern that often has physiological, cognitive and behavioral components." (pp. 98-99). According to Averill (1973), reducing stress responses entails gaining control over a stressful stimulus event. Cognitive control entails interpreting and gaining information concerning the predictability of the stressor (vigilance). Predictability of a stressor is associated with decreased cardiovascular responsivity (After interpretation and evaluation, responses must occur to forestall the aversive effects of the stimulus (behavioral control). Behavioral control can be subdivided into 1) behaviors that modify the stimulus or 2) behaviors which alter the way the threatening stimulus event is perceived. Averill (1973) proposed that lack of

behavioral control is caused by a lack of responses which directly modify the perception, or actual characteristics, of a threatening event. This theory of control can be interpreted to mean that for Blacks in racist situations, lack of control is equivalent to either not being able to modify/terminate the racist event and/or not being able to modify perceptions of the event so that it is perceived as less aversive (Averill, 1973). Where control is low (powerlessness) or individuals perceive control to be low, passive coping may occur. Passive coping has little effect in ameliorating the contingencies of racism, yet may make the perception of the stressor less aversive. The issue of control also implies vigilance for the threatening stimulus.

Vigilance to racism may include an overall hypersensitivity to all situations involving race (Fanon, 1967). Thus, coping with racism may entail three factors: 1) vigilance, 2) active versus passive coping and 3) perception of control.

Vigilance. Blacks may be more culturally sensitized to racism than to other social situations. This heightened sensitivity may be the result of a learned omnipresent watchfulness which is required to avoid falling prey to racism.

Vigilance to racist events has not been studied experimentally, but animal studies may provide insight into the types of coping that are involved in low-control aversive situations. The vigilance that is required by rats to push a lever to avoid shock may be comparable to the vigilance required of Blacks to avoid racism. In avoidance schedules, a rat may avoid shock by engaging in certain criterion behaviors after a signal announcing that shock is imminent. Vigilance is required to keep track of the pre-shock signal.

Langer, Obrist and McCubbin (1979) found that responding to signaled

shock greatly increased blood pressure levels. Often racism is signaled by non-verbal cues such as intense eye contact on the part of the racist; racial insinuations often follow. Blacks are required to take immediate notice of these signals and to engage in behaviors that will delay the occurrence of racism (avoiding or ignoring it).

Active versus Passive Coping. After vigilant efforts to detect racism, Blacks may choose to react to racism using active or passive coping repertoires (Cheek, 1976). In one experiment, monkeys were yoked in pairs, with one monkey making active coping responses to avoid receiving shock (Corley, Shiel and Mauck, 1973). The monkey who had control over shock developed stress-related ulcerations and subsequently died. Active coping is associated with blood pressure increase during stress; whereas, passive coping has little or no physiological effect (Obrist, 1981).

In human research, either active coping with little effect on aversive contingencies or passive coping coupled with hostility is thought to be deleterious to the health of Blacks. The concept of John-Henryism states that Black men may attempt active, effortful coping while armed with few environmental resources (ie. power and control); this may put them at risk physiologically (James, 1985). In a later study, which supports the concept, it was found that there was a higher percentage of hypertension among individuals who were high in John Henryism and low concerning socioeconomic indices (James, Strogatz, Wing and Ramsey, 1987).

To this extent, it appears that some forms of passive coping by Blacks in racially stressful situations may be physiologically adaptive. A study performed by Harrell (1985) supports this notion. Harrell (1979) writes,

"...it may be that the low-keyed, lethargic style of apathetic individuals has adaptive psychophysiological consequences" (p. 100). Clark and Harrell (1982) found that individuals scoring high on an apathy scale exhibited low blood pressure. This style is characterized by recognition of the racist elements of this society and by lack of effort directed toward developing a plan of action for mitigating the effects of racism itself (Harrell, 1979). Instead, there is a "characteristic lack of action or coping maneuvers in response to racism" (p. 100).

Passivity as a form of apathy may not have serious health effects; however, passivity as a mask for unexpressed hostility may produce deleterious health effects. Passivity as a strategy for coping with racism has been described by Cheek (1976) as, "... a traditional mask for hostility, anger and aggression" among Blacks (p. 17). When passivity is coupled with hostility, the long term result may be a personality grounded in social alienation, cynicism or ecosystem distrust (Triandis, 1975). For the purposes of this research, ecosystem distrust is thought to subsume the behavioral, perceptual and affective outcomes of existence in a racist milieu.

Anger suppression, hostility and cynicism, alienation, perceived powerlessness and racial mistrust are thought to be outcomes of ecosystem distrust. Anger suppression, hostility and cynicism have proven cardiovascular implications (Barefoot, Dahlstrom, and Williams, 1983).

Perception of Control. There may be several factors influencing the manner in which Blacks perceive the degree of control that they possess in society. The locus of control orientation explains individual differences in perceptions of personal control over life events in terms of control over

reinforcement. The construct desire for control explains individual differences in motivation to obtain and maintain power. Social alienation, as a construct, explains individual differences in terms of feelings of normlessness, isolation and powerlessness caused by being a member of a social out-group.

Houston (1986) writes that, "the perception of a situation is influenced by the extent to which individuals believe they can effectively deal with it....Locus of control is a personality dimension that is relevant in this regard" (p. 50). The concept of locus of control was developed out of social learning theory. Behavior is said to be based on reinforcement and expectancies. Locus of control describes the degree to which individuals perceive that they are in control of the events that shape their lives. Individuals who are internally oriented believe they are in control of their destinies. Externally controlled individuals, on the other hand, believe that reinforcements are not under their personal control, but rather are controlled by chance or luck. Rotter (1966) defined the concept in this way:

When a reinforcement is perceived by the subject as following some action of his own, but not being entirely contingent upon his action, then in our culture, it is typically perceived as the result of luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of the forces surrounding him. When the event is interpreted in this way, by an individual, we have labeled this a belief in external control. If the person perceived that the event is contingent upon his own behavior relatively, this is a belief in internal control (p.1).

Rotter (1966) believed that the sources of reinforcement in each person's life can be perceived and learned differently depending on past reinforcement histories. With this in mind, "it is expected that since the backgrounds of Blacks and Whites in this country tend to be different, their

reinforcement expectancies also will differ" (Friday, 1985). Blacks may perceive themselves in this society as a rather powerless group and as a result, have often seen themselves in situations where reinforcements were manipulated by others. Reinforcements have often been denied to Blacks even when they respond within the correct contingencies for reinforcement.

Demographics have been thoroughly investigated in regard to locus of control. Rotter (1966) reported differences between ethnic groups in his original paper. Most of the evidence indicates that Blacks and individuals from lower socioeconomic groups who have very little access to power, social mobility and opportunity, are relatively more external in their beliefs (Phares, 1976; Steele, 1978). Battle and Rotter (1963) and Lefcourt and Ladwig (1965, 1966) were among the first to report that Blacks generally have higher external scores than Whites, and lower class individuals are more external than middle class persons. In one study White males were significantly more internal than Blacks or Mexican-Americans. Rotter (1966) reported no sex differences on the scale. However, a number of studies have since shown that gender and locus of control orientation are related (Joe, 1971; Falkowski and Falk, 1983). Falkowski and Falk (1983) found that Black females who anticipated careers as homemakers were more external than White women who anticipated careers as homemakers. Falkowski and Falk report that the parents of the women were over-represented by fathers with low occupational status, nonemployed mothers, and lower academic performance. Overall it appears that Blacks, people with low socioeconomic status and females are more likely to score in the external range.

Feelings of powerlessness or perceived lack of control (external locus of control) have been found to have cardiovascular correlates. Locus of control has been related to blood pressure in several studies (Houston, 1972; Manuck, Craft, and Gold, 1978; DeGood, 1975). DeGood (1975) found an interaction between diastolic pressure, situational control and locus of control such that, "blood pressures were lowest where the personality and situational control factors were congruous." People with an internal orientation demonstrated increased blood pressure and heart rate reactivity, while externally oriented people showed greater diastolic pressure reactivity when confronted with coping to an aversive situation. Desirability of control has been found to interact with Type A, which is associated with cardiovascular reactivity. Burger and Cooper (1979) found that Type A's score higher in desire for control than Type B's. Lawler and Schmied (1987) found that Type As who reported feeling powerless had higher levels of systolic and diastolic blood pressure and heart rate than Type As with control. Additionally, Schmied and Lawler (1989) found that external locus of control Type As were more reactive than Type Bs to a control-relevant stressor. LaCroix and Haynes (1985) found that female clerical workers with high job demands and low control were 5.2 times more likely to develop coronary heart disease than other working women. Lawler, Schmied, Armstead and Lacy (1988) found that Type A interacted with high desire for control to produce large increases in heart rate to a task. Thus, it appears from the literature that low perceived control and high demands are associated with cardiovascular reactivity.

It is possible that existence in a racist milieu is analogous to these characteristics and that the same correlates of control may be related to cardiovascular reactivity to racist stimuli in Blacks. Because true environmental control is seldom accessible to Blacks, various coping mechanisms are often employed to alleviate the stress associated with lack of environmental control. Social alienation is said to be a passive coping mechanism displayed by individuals who lack environmental control among Blacks.(Crain and Weisman, 1972). Social alienation is defined in terms of normlessness, powerlessness, and a sense of isolation from majority society (Durkheim, 1953; 1973). Interestingly, powerless, normlessness and isolation are terms described throughout the literature as outcomes of racial stress (Fanon, 1967; Baldwin, 1980;).

Middleton (1963) was one of the first researchers to indicate that Blacks often displayed stronger feelings of alienation than Whites. Fleming (1981) found that Black students in a White majority university reported high levels of alienation. Although these studies alluded to the notion that racial discrimination is associated with social alienation (i.e. powerlessness, normlessness and a sense of isolation), few researchers have sought to understand the mechanisms of interaction between the psychological outcomes of racism and their physiological consequences.

Social alienation was proposed by Baker (1987) as an outcome of existence in an environment that requires constant social adaptation based on race. This in turn creates a "susceptibility to illnesses, which is linked to stress from having to assume a bicultural identity in an environment often permeated with social alienation and economic hardship." Such adaptation

is intrinsically related to one of the main factors of social alienation, powerlessness.

Lack of environmental control in real life is often associated with competitive goal blocking and harassment. Anger is an affective outcome of these situations. Conditions of competition with goal blocking and harassment have been shown to elicit blood pressure increases and have been correlated with inward suppression of anger as assessed by anger scales taken from the questionnaire used in the Framingham Heart study (Diamond, Schneiderman, Smith, Vorp and Pasin, 1983). Subsequently, control may interact with hostility (Vantress and Williams, 1968). Peffley (1987) found that external control orientation was related to hostility for women, but not for men. Collins (1974) indicates that women's expressions of hostility may be related to ideations that the world is uncontrollable and unjust regardless of coping efforts. In their study of Blacks and discrimination, Crain and Weisman (1976), posit a similar explanation for the relationship between externality and hostility among Blacks. Keeping this in mind, one is led to wonder if it isn't the hemodynamically important, hostility factor of Type A behavior pattern that is linked to control, rather than being linked to Type A as a global construct (Glass, 1977). To this extent, it would prove fruitful to examine the literature concerning individual differences in hostility.

Anger Expression

There is much definitional confusion regarding anger expression, anger suppression and hostility. Spielberger, Johnson, Russell, Crane, Jacobs and Worden (1985) comment that, "The literature on anger, hostility

and aggression reveals a great deal of conceptual ambiguity and confusion." These terms are used almost haphazardly throughout the literature. The following descriptions of hostility, suppression and outwardly directed anger will provide the conceptual basis for affective terms used in this study. Speilberger et al, 1985 describe hostility as an "complex attitudinal state that motivates aggressive behaviors directed toward destroying objects and injuring other people....When the anger expressed in aggressive behavior is motivated by animosity and hateful destructive attitudes, it may be properly labeled as hostility." Cook and Medley (1954) however, describe hostility as an attitude of negativism marked by, "....chronic hate and anger....Individuals who are highly hostile have little confidence in thier fellowman and sees people as dishonset, unsocial, immoral ugly and mean....." No single comprehensive definition exists that has relevance to all aspects of hostility, yet we get a communality of negativism and chronic hate. Speilberger et al (1985) write,

When anger is held in (suppressed), it is subjectively experienced as an emotional state. S-anger, which varies over time as a function of the provoking circumstances and the individual's levels of trait anger....Anger directed outward, may be expressed in physical acts such as assaulting other persons, destroying objects and slamming doors. The outward expression of anger may also take the behavioral form of criticism, insult, verbal threats or the extreme use of profanity.

Background

In attempt an to explain the pathogenesis of essential hypertension, early researchers sought to augment the physiological findings concerning anger coping styles and cardiovascular reactivity with theories of personality and emotionality. Franz Alexander (1939) approaching the problem from a psychodynamic paradigm, hypothesized that hypertension was related to a

conflict between desire to express anger and the desire to be submissive and passive. This led to the idea that suppressed anger may be a psychological variable somehow effecting the development and maintenance of essential hypertension. Spielberger, et al. (1985) write, "Alexander theorized that the angry feelings of hypertensives were suppressed because of their anxiety about the consequences of expressing anger, and that the hypertensives' strenuous efforts to control their anger led to chronic activation of the autonomic and cardiovascular systems, and eventually, to fixed elevations in blood pressure." Early support of this assumption is found in data obtained by Wolf and Wolff and associates (Wolf and Wolff, 1951; Wolf, Cardona, Shepard, and Wolff, 1955). When comparing hypertensive patients to normotensive patients and subjects with a variety of other psychosomatic diseases (i.e. vasomotor rhinitis and bronchial asthma), they found that hypertensive patients demonstrated a marked pattern of preparedness to take offensive action by latent anger. Hypertensive patients seemed to prefer active coping and were found to be cynical, suspicious and tense. Graham, Kabler and Graham (1962) observed that there is a specific attitude associated with hypertensives which is marked by awareness of threat of bodily harm, without any possibility of running away or fighting back. Vigilance to potential harm, angry feelings of powerlessness and cynicism are adjectives describing early conceptualizations of the hypertensive personality. While these observations are based on purely subjective inferences, they support current empirical research findings (Friedman and Rosenman, 1971; Williams, Haney, and Blumenthal, 1981).

The development of the Type A behavior pattern is thought to be a response to perceived lack of control (Glass, 1977). Rosenman and Friedman (1971) described the Type A individual as competitive, hard driving, ambitious, and time conscious. Important to the present study is the fact that the Type A individual is said to demonstrate high levels of free-floating hostility. Although Type A behavior has been shown to be a risk factor in coronary heart disease as shown by the Framingham Massachusetts Heart Study (Haynes, Levine, Scotch, Feinleib, and Kannel, 1978;) and the Western Collaborative Study (Matthews, Glass, Rosenman and Bortner, 1977), the hostility dimension of Type A behavior may be the true contributor to coronary risk.

In support of this assertion, Matthews, Glass, Rosenman and Bortner (1977). found that within the "structured interview", the potential for hostility dimension of Type A behavior pattern is the greatest risk factor for developing coronary heart disease. This would indicate that perhaps global Type A behavior may not be the best predictor of coronary heart disease and that the contribution of free-floating hostility as a correlate of blood pressure hypereactivity and as a risk factor associated with the development of coronary heart disease must be investigated. On the other hand, since most Type A research has been performed on White males, the applicability of Type A has not been demonstrated concerning minority women. Some research suggests that Type A may not be an appropriate construct in regard to Black women (Smyth, Call, Hansell, Sparacino, and Strodbeck, 1978).

Smyth, et al. (1978) examined Type A and blood pressure in hypertensive and normotensive inner city Black women. The results of the

Smyth et al. study demonstrated that Black female Type As, as categorized by use of the structured interview, were not significantly more likely to be hypertensive than Type Bs, nor were Type A hypertensives more likely to exhibit greater blood pressure variability during a Type A interview than hypertensive Bs. This weakness of association between Type A and physiological reactivity is similar to findings concerning a sample of predominantly White normotensive Type A women (Lawler and Schmied, 1982). The anger scales derived from the 300 item interview utilized in the Framingham study (Haynes et al, 1978), demonstrated a strong correlation between coronary heart disease and hostility scores. And also neuroticism Diamond, Schwartz, Smith, Vorp, and Pasin (1982) found that responses from both the Framingham Type A Scale and Framingham Anger Scales were strongly associated with cardiovascular reactivity during experimental conditions of competition and goal blocking. Williams, Haney, and Blumenthal (1981), using fifty hostility items derived from the MMPI (Cook and Medley Scale) and the structured interview found that, "when adjustment is made for hostility scores, the strength of the relationship between Type A behavior pattern and level of coronary atherosclerosis is diminished, though it remains statistically significant." Williams et al. (1981) concluded, "To the best of our knowledge, the present finding of a relationship between hostility scores and coronary atherosclerosis represents the first example of a psychometrically determined characteristic more strongly related to an index of coronary heart disease than Type A behavior pattern as measured using the structured interview." Barefoot, Dahlstrom, and Williams (1983) found in a prospective study investigating hostility,

coronary heart disease incidence and mortality rates that high hostility scores on the Cook and Medley scale predicted atherosclerosis and mortality from many causes for 255 physicians. Their findings indicate that, "high hostility scores not only contribute to the pathogenesis or progression of cardiovascular disease, but they also may affect one's ability to survive other disorders. Similarly, Dembroski, James, MacDougall, Williams, Haney and Blumenthal (1985) used the Type A structured interview to examine the relationships between factors such as anger-in and potential for hostility and risk of coronary heart disease. They conclude, "Of all attributes measured, only the potential for hostility and anger-in were significantly positively associated with disease severity, including angina symptoms and number of myocardial infarctions. Analysis of the Cook-Medley Hostility Scale on 1,500 patients who underwent coronary angiography revealed that two components of the Type A behavior pattern, lack of trust and cynicism, may be risk factors for heart disease as measured by the cynicism and paranoid alienation subscales of the HO Scale (Williams, 1984).

Elevated blood pressure, as well as coronary heart disease has been linked to anger suppression. In a series of studies, Harburg and colleagues examined relationships between race, anger suppression and blood pressure. In the first study (Harburg, Erfurt, Hauenstein, Chape, Schull, Schork, 1973), they hypothesized that anger suppression may be implicated in the greater incidence of hypertension among Black Americans. Anger suppression was defined as an individual's tendency to inhibit aggressive attitudes or actions and to feel guilty if such behavior is expressed. This construct was assessed by obtaining self-reports about anger expression and

resultant guilt to hypothetical situations. One situation involves a police officer "blowing up" at something that wasn't the respondent's fault. It was found that dark-skinned Black males, living in high stress areas more frequently exhibited anger suppression and had higher mean diastolic blood pressures than any other group.

In a second study, (Gentry, Harburg, and Hauenstein, 1973) focused on female subjects and required respondents to answer an anger-in/anger-out inventory concerning six hypothetical situations including anger elicited by parents, spouse and people outside of the home environment (angry boss or housing discrimination). For Black females in high socioeconomic stress areas, an anger-in response to either an angry boss or housing discrimination was associated with higher diastolic blood pressure levels (means=87.8 and 87.4 mmHg, respectively) than an anger-out response, with both means around 80.9 mmHg. The situations of the angry boss and housing discrimination are potentially racist situations.

In a third study, reflective coping style (e.g. ones that bypass anger and focus on a problem solving approach to the anger-provoking situation) were compared to anger-in coping styles (Harburg, Blakelock, and Raeper, 1979). Approximately 15% of those individuals utilizing the "resentment" or anger-in coping style were hypertensive as compared to only 9% of those using the "reflective" style. Blacks in general, showed both higher systolic and diastolic blood pressures than Whites.

In a 1982 study, Gentry, Chesney, Gary, Hall and Harburg found that chronic suppressed anger and race were highly involved with blood pressure increase and risk of hypertension, giving further evidence to the anger-

in/anger-out theory. Gentry, Chesney, Kennedy, Hall, Gary and Harburg (1983) found that people who habitually suppress their anger have higher systolic and diastolic blood pressure than those who express their anger. Gentry (1984) found that "Blacks who are high in interracial hostility and who tend to keep anger suppressed have without question the highest mean diastolic pressures" (p. 142). Gentry (1985) hypothesizes that, "Presumably, the hostility carried around by Blacks who have this behavioral trait (hostility) triggers anger (emotion) which, when suppressed, leads to elevated blood pressure..."(p. 143).

Utilizing scales that measure self-reports of frequency of anger suppression as opposed to trait measures of anger suppression allows the researcher to thoroughly examine the topography of the anger experience. Spielberger, Johnson, Russell, Crane, Jacobs, and Worden (1985). Spielberger et al. (1985) found that "the literature on anger, hostility and aggression reveals a great deal of ambiguity and confusion." Measuring instrumentation was thought to reflect the ambiguous operational definitions of the constructs. Attempting to create better instrumentation for explication of the concept of suppressed anger, Spielberger et al. (1985) constructed the Anger Expression Scale (AX Scale). Most previous scales (e.g. Harburg et al. 1978) were trait measures of habitual anger suppression/hostility. The Anger Expression Scale (AX Scale) however, was designed to assess how often angry feelings are experienced and expressed or suppressed in specific situations. Spielberger et al. (1985) writes, "Since the AX scales assess how often subjects respond in particular manner, rather than how they respond to a particular situation, scores on these scales

provide an index of the frequency that an individual expresses or suppresses anger across a variety of anger-provoking situations that are typically encountered in life." Statistically, anger-in and anger-out have been shown to be," empirically independent, as well as factorially orthogonal" (Spielberger et al., 1985). Physiological investigation indicated that high anger suppression scores (Ax-In) were positively correlated with elevated diastolic and systolic blood pressures, while outward anger expression scores (Ax-Out) were not associated with blood pressure elevations. More recent research has also found anger-in (harboring grudges) associated with higher systolic and diastolic blood pressure levels in Black and White adolescent males, respectively (Johnson, Spielberger, Worden, and Jacobs, 1987). Similarly, Johnson, Schork, and Spielberger (1987) found that anger-in was associated with higher blood pressure levels in Black and White females; moreover, they found a race by anger-in interaction indicated that Black females began to increase blood pressure at lower levels of anger-in than White females.

CHAPTER 4

HEMODYNAMICS OF ANGER

Anger has been shown to be related to arousal within the cardiovascular system (Cannon, 1929; Schwartz, Weinberger, and Davidson, 1981). It is suggested that the manner in which a person deals with anger is a method of coping influencing the functioning of the cardiovascular system during stress (Schwartz, et al, 1981). Furthermore, emotional behavior can serve as "a basic construct linking psychological factors to pathophysiological process" (Diamond, 1982). The experience and expression of anger have been long regarded as important psychological factors predisposing individuals to hypertensive disease. The hemodynamics related to anger expression may play a role in mediating the pathogenesis of hypertension.

Several early researchers proposed a link between cardiovascular correlates and emotionality in the form of anger. Cannon (1936) was one of the first researchers to demonstrate a relationship between sympathetic arousal, blood pressure and anger (sham rage in rats). Cannon (1936) described visceral emotional responses in terms of a physiological arousal producing stereotyped cardiovascular changes associated with "emergency reaction" or the "fight or flight response". Hypothesizing that the main purpose of this response is adaptation to environmental threat, Cannon (1936) suggested that when an organism confronts a threatening situation, whether physical, mental or emotional, it must decide whether to flee or fight, thus ensuring the survival of the species. This sympathetic response was thought of as a defense reaction.

Selye (1956) suggested that the adrenal cortical axis responds to both threatening mental and emotional stimuli. In his conceptualization of the "General Adaptation Syndrome", he posits that the first stage, or alarm reaction is associated with arousal of the adrenal cortical axis and is sympathetic in nature. There is a release of catecholamines and cortical hormones which produce "fight or flight-type" coping on the part of the organism. This coping and physiological adaptation to the environment was termed "stress". Stress was seen by Selye as a "specific syndrome which consists of all nonspecifically induced changes within a biological system." Selye saw stress and emotionality as being intimately linked to physiology.

Early studies of laboratory stress, cardiovascular activity and indirect neuroendocrine reactivity have helped delineate the nature of the physiological response to anger. Arnold (1950) suggested that anger differs from fear in that norepinephrine is secreted by the parasympathetic system during anger, while epinephrine is secreted by the sympathetic system during fear. Ax (1953) induced anger in normotensives through exposure to obnoxious criticism by a confederate. He also induced fear by exposing subjects to an allegedly malfunctioning piece of equipment with the danger of shock. During the anger condition, diastolic blood pressure increased, heart rate decreased, and galvanic skin response and muscle tension decreased. During the fear condition skin conductance, muscle potential and respiration rate increased. The anger response was said to resemble the reaction to the injection of both adrenaline and noradrenaline, while fear produced an adrenaline-like response.

Later, Funkenstein, King and Drolette (1954) hypothesized that these physiological components of anger are mediated by the direction of anger expression (i.e. inward toward self or outward toward others). In that study, male subjects were harassed and criticized while trying to solve math problems. This situation may be comparable to an overtly racist situation. On the basis of post-task interviews, subjects were classified as "anger-out", "anger-in", "mixed anger-anxiety" or "anxiety reactors". Physiologically, the anxiety and anger-in group were similar, exhibiting systolic blood pressure and heart rate increases. The anger-out group showed large diastolic blood pressure increases, increased peripheral resistance and little heart rate change.

Wolf, Cardona, Shepard, and Wolff (1955) used the ballistocardiography technique to measure the hemodynamic response to cold water hand immersion and a stress interview. One must make note that the ballistocardiography technique is somewhat inaccurate. The stress interview produced two types of responding. Subjects who responded to the interview with high cardiac output and a drop in total peripheral resistance tended to express emotional upset freely, while subjects with high peripheral resistance tended to suppress emotional distress. Both types of responses showed concomitant blood pressure increases. These blood pressure increases are due to different hemodynamic mechanisms. These types of responses are classified as alpha-adrenergic and beta-adrenergic. Beta-adrenergic responding leads to increased heart rate and cardiac output (McKinney, Hofschire, Buell and Eliot, 1984). Alpha-adrenergic responding leads to an increased vascular response (pressor response) entailing greater

constriction which may lead to elevated total peripheral resistance (McKinney et al., 1984). Diastolic blood pressure levels are especially hemodynamically related to alpha-adrenergic responding and elevated peripheral resistance (Musante, et al., 1990).

Schwartz, et al. (1981) indicate that anger conditions tend to produce net vasoconstriction in major muscle groups and elevation of diastolic pressure, while fear and other emotional conditions tend to show increases of systolic pressure and heart rate. It is important to remember that blood pressure change is a function of increases in cardiac output, increases in total peripheral resistance or increases in both. Also, total peripheral resistance takes into account more of the contribution of diastolic pressure than systolic pressure. Increased diastolic pressure readings seem to go hand in hand with increased peripheral resistance. Vasoconstriction was also part of the hemodynamic response in subjects with high peripheral resistance. Providing a description that is very similar to the alpha-adrenergic response, Diamond (1982) summarizes the hemodynamics associated with neuroendocrine responses and anger. He writes

Epinephrine and norepinephrine are primary neurotransmitters in the sympathetic nervous system. Epinephrine is excreted by the adrenal medulla and tends to augment blood pressure by increasing cardiac outflow, heart rate and contractile force; it also elicits skeletal muscles vasodilation. Norepinephrine, a more potent pressor agent is excreted from nerve endings and the adrenal gland and tends to augment peripheral resistance by eliciting skeletal muscle vasoconstriction (p. 411).

Brod (1983) writes, "The hemodynamic response to a psycho-emotional stimulus is, no doubt, mediated by the alpha-sympathetic nerves." Schwartz, Weinberger and Singer, (1981) report that anger appears to evoke

the greatest overall cardiovascular responses. Norepinephrine, a strong pressor agent, appears to be the important neurotransmitter involved in the anger response and even more importantly, in anger-suppression response. Hostile individuals have been found to excrete more norepinephrine than more passive or anxious subjects (Freidman, George, Byers, Rosenman, 1960). Sensory tasks elicit a beta-adrenergic response with elevated cardiac output while, mental concentration tasks elicit alpha-adrenergic responses with increased peripheral resistance. Rosenman (1985) states that,

Anger is a cognitive response that is associated with personal appraisal and interpretations and induces an active coping response in the susceptible individual. Compared with fear or anxiety, an expressed anger response is associated with relatively smaller rise of heart rate and greater rise of diastolic blood pressure due to peripheral vasoconstriction.... the special role of anger for hypertension resides in the unique pressor response to unexpressed anger (p. 105).

It may be that the physiological response to anger-suppression/expression requires cognitive concentration and is alpha-adrenergic in nature. Suarez, Williams, Harlan, Peoples, Kuhn and Schanber (1990) found that harassed subjects who possessed high hostility scores on the Cook-Medley Scale showed greater diastolic blood pressure increase, greater forearm blood flow changes to an anagram task and poorer NE recovery than high and low hostility subjects in other conditions, including the non-harassed condition. The task alone was not related to any differences between hostility groups, Suarez et al. (1990) write, "these data are consistent with the prediction that a hostile orientation interacts with interpersonally stressful situations to produce potentially pathogenic

cardiovascular and neurohormonal responses." It also appears that intrapsychic coping is the important factor.

This interactive relationship between intrapsychic coping, anger expression/suppression and hemodynamics may have particularly important implications for Blacks, considering the current findings concerning Blacks and alpha-adrenergic hyper-reactivity. High levels of anger suppression among Blacks may interact with a racial propensity to react physiologically with blood pressure increases due to peripheral vasoconstriction, as opposed to cardiac output increases. Blacks have been shown to demonstrate higher levels of suppressed hostility than Whites in a number of studies (Johnson, Spielberger, Worden, and Jacobs, 1987; Johnson, Schork, and Spielberger 1987; Durel Carver, Spitzer, Llabre, Weintraub, Saab and Schneiderman 1989). Musante, Treiber, Strong and Levy (1990) report that recent evidence supports that beta-adrenergic activity may be less influential in producing cardiovascular reactivity among Blacks than is alpha-adrenergically mediated reactivity. Hemodynamic findings may provide a perspective for interpreting Black/White response differences.

Most testing for alpha-adrenergic reactivity in Blacks has utilized the cold pressor stimulus, which is physical; not interpersonal or emotion related (Anderson, Lane, Monou, Williams and Houseworth, 1988; Tischenkel, Saab, Schneiderman, Nelesen, Pasin, Godstein, Spitzer, Woo-Ming, and Wiedler, 1989). Several studies have examined differences between Whites and Blacks on alpha-adrenergic tasks, such as the cold pressor task. Anderson found that mental arithmetic (a beta-adrenergic task) failed to produce heart rate and systolic blood pressure increases in young Black

women with positive family histories of hypertension. This finding would appear to indicate that Black subjects with a positive family history did not respond to stressors with the typical beta-adrenergic stress pattern found in many of the studies utilizing White subject populations. The previous study may also indicate an inherited component to vascular response. Black individuals may be genetically predisposed to respond to stressors with alpha-adrenergic types of responses. Durel, et al (1989) found that Black women showed greater systolic and diastolic blood pressure reactivity during the cold pressor task, with less reactivity during the structured interview.

From a psychosocial perspective, interpersonal conflict may elicit hostility which may stimulate alpha-adrenergic pathways. High levels of hostility among Blacks may be the result of threatening interracial conflict situations in which there is no way of positively resolving conflicts due to lack of authority (Crain and Weisman, 1976). Edwards found that among Black South Africans this hostility was also related to mistrust of Whites. Terrell and Terrell (1981) found similar expressions of racial mistrust in a sample of African Americans. This mistrust, hostility and anger suppression may produce a sympathetic activation similar to a defense reaction. Because of a tendency to react with alpha-adrenergic activation, Blacks may show high magnitude pressor responses in response to interpersonal conflict, especially those situations taking the form of racism. Hardy and Smith (1988) found that highly hostile subjects showed higher diastolic blood pressure reactivity during a task eliciting high levels of interpersonal conflict, than did low hostility subjects. Suarez, Williams, and McCrae (1988) found

that high hostility scores predicted cardiovascular reactivity during harassment, a type of intrapersonal conflict.

There are two studies examining relationships between racist stimuli and physiological reactivity (Sutherland and Harrell, 1986; Armstead, et al., 1989). Neither examined reactivity in the form of changes in peripheral resistance; however, either blood pressure or heart rate were examined in these studies. In both of the studies, racial stimuli were vicarious (i.e. imagery alone and film stimuli and imagery), thus the sensory nature of the task itself may produce mixed alpha and beta-adrenergic effects. In a White subject sample, Schwartz, Weinberger and Singer (1981) found that imagery conditions of fear and anger differed in that anger imagery produced greater increases in diastolic blood pressure, heart rate and slower recovery of systolic pressure. Sutherland and Harrell (1986-87) assessed cardiovascular reactivity to fearful, neutral, and racially noxious image scenes in 62 Black female undergraduates. They were given progressive relaxation training and were instructed to image an event on cue. The fear imagery involved getting blood drawn by a nurse, while the racist imagery involved being unjustly accused of shoplifting by Whites. Findings indicated that the fearful and racially noxious scenes elicited similar increased heart rate activity. Results of multiple regression analyses in which personality variables served as predictors of physiological activity revealed that the speed and impatience dimension of the Type A pattern (coronary prone behavior) was related to increased heart rate. The results suggest that the imagery paradigm is useful for studying the effects of complex social stressful situations akin to those growing out of racism.

In a study performed by Armstead, et al. (1989), the physiological effects of racism, as a stressor, were examined as they related to blood pressure and anger experiences in Black college students. These researchers used a combination of imagery and audiovisual stimuli in the form of film scenes containing anger-provoking and racist situations. A neutral scene was included for the purpose of comparison. By asking subjects to imagine themselves in the main character's place, the effects of racism could be ethically examined in the laboratory. Analyses revealed that mean arterial blood pressure significantly increased when racist stimuli were presented, but not when anger-provoking or neutral stimuli, were presented. Mean arterial pressure is an important constituent of total peripheral resistance. Perhaps there would have been a concomitant change in peripheral resistance, if it had been measured. Blood pressure scores were significantly correlated with the two trait anger measures. The low anger out group had higher mean arterial pressure than the high anger out group. In addition, the high anger-in group had higher systolic pressure than the low anger-in group. These anger expression findings for mean arterial pressure may indirectly provide support for the notion that anger expression in Blacks may occur via alpha-adrenergically mediated peripheral responses. Unfortunately, this study tells us nothing concerning the hemodynamic mechanism underlying these changes.

CHAPTER 5

PURPOSE AND RESEARCH QUESTIONS

The present study hinges on the idea that racism is a psychosocial stressor with both emotional and cardiovascular outcomes. Current research has failed to consider the effects of racism as a stress factor that may contribute to the higher incidence of essential hypertension among Blacks. Chronic exposure to racism may result in feelings of powerlessness, hostility and anger suppression. These forms of emotional expression have been found to be related to elevated blood pressure and increased reactivity. It was the purpose of this study to extend the understanding of the physiological and psychological correlates of the experience of racism in Black women and to explore racial differences in responsivity and affective coping to racial stressors. The research compared the cardiovascular effects of racial stressors to other anger- provoking and neutral stressors among Black and White females. Additionally, this study investigated the magnitude of physiological responses to an interpersonal stressor (discrimination interview) and a traditional stressor (video game challenge). Exploratory analyses were performed to answer research questions not previously defined in the literature. Another purpose of this study was to assess the relationship of family history of hypertension, reactivity and racial differences between Black and White women. The present study also attempted to delineate possible racial differences in relationships between affective responses to racism, personality characteristics and physiological responsivity. The research questions were as follows:

1. Does exposure to racist stimuli increase systolic, diastolic and mean arterial blood pressure levels above resting blood pressure levels and blood pressure levels during exposure to anger-provoking and neutral film stimuli?
2. Should differences occur between resting blood pressure and blood pressure after the racist film stimuli, do concomitant differences occur between rest and the three film stimuli for heart rate, total peripheral resistance and stroke volume?
3. Are there racial differences in the pattern of responsivity to the three film stimuli?
4. Is mood associated with blood pressure during the racist scene?
5. Are there differences between resting blood pressure and blood pressure during an interview pertaining to personal discrimination
6. Should differences occur between resting blood pressure and blood pressure during the discrimination interview, do concomitant differences occur between rest and heart rate, total peripheral resistance and stroke volume during the personal discrimination interview?
7. Are there differences between resting blood pressure and blood pressure during the active coping stressor, video game challenge?
8. Should differences occur between resting blood pressure and blood pressure during the video game, do concomitant differences occur between rest and heart rate, total peripheral resistance and stroke volume during the video game challenge?
9. Are feelings of powerlessness, anger suppression, hostility and racial mistrust associated with the physiological response to racist stimuli? Are these individual difference variables different between Blacks and Whites?
10. Are feelings of powerlessness, anger suppression, hostility and racial mistrust associated with the physiological response to the discrimination interview? Are these individual difference variables different between Blacks and Whites?

CHAPTER 6

METHOD

Subjects

A total of 70 women (34 White, 34 Black, 1 Oriental, and 1 Hispanic) ages 25-57 years, participated in this experiment. The thirty four White females provided a comparison group for the psychological and physiological measures. Because this study was directed toward examining Black/White differences in responsivity, data from the Oriental and Hispanic subjects were not included in the data analysis. Additionally, two other subjects were excluded from the study due to an inability to detect cardiovascular signals even after using the additional ECG monitor cable designed to aid in signal detection.

Subjects were recruited from a list provided by the university office of employment, from the campus telephone directory and from adult evening school classes. Subjects were then sent letters describing the research. Appendix 1 contains the recruitment letter. Interested individuals scheduled appointments to participate in the study by telephoning the Health Psychology laboratory. Upon scheduling an appointment, individuals were provided with a questionnaire packet to be completed at home and brought to the laboratory at the time of testing.

The questionnaire packets were completed at home, at the leisure of the participants. Approximately one day before the scheduled appointment, subjects were re-contacted to confirm their participation, to remind them to bring their completed questionnaire packets to the experimental site and to remind them to refrain from certain foods and activities. Subjects were

asked to refrain from consuming beverages or foods with caffeine, to avoid eating chocolate and to avoid strenuous exercise at least 2 hours prior to arriving at the experimental site. As an incentive to participate, the names of all participants were entered in a cash drawing. In this drawing, there were two prizes for \$75.00 cash and one prize of \$150.00 cash. Participants could win only one prize. These drawings occurred at the end of the study.

Apparatus

The experimental session were carried out in three of the rooms contained in the Human Psychophysiology Laboratory. The waiting room (15 x 19 feet) contained a chair and desk at which subjects completed consent forms. The acoustically sound-proofed, subject room (5 X 9 foot) contained a desk on which materials for the tasks and physiological recording are placed. There was a straight back chair for the experimenter and a reclining lounge chair for the subject. Approximately twenty-six inches in front of the subject was a Quasar Video Viewer (Model # UV8213), consisting of a 13" color television monitor with attached video cassette player. In close proximity to the television, was a Nintendo Home Entertainment Control Deck and a control panel (#NES-005). A Panasonic audiotape recorder (Model #RQ-2739) shared the desk with this equipment. A Robertshaw, "Lux" kitchen timer (Model # CP2428) also shared this desk. To allow the experimenter to monitor the progress of the stimulus portion of the experiment, a Radio Shack FM wireless room monitor (Model # 43-208) was placed inconspicuously in the experimental chamber near the subject. The monitor receiver was located in the equipment room. The equipment room contained a Bo med NCCOM 3

Cardiovascular Monitor and a Roche Model 1216 Arteriosonde automatic blood pressure monitor. A 6 cm diameter hole in the wall allowed for electric and recording cables to pass from the subject room to the equipment room. Subjects were assigned to female assistants for physiological hook-up and testing. This is thought to control for experimenter gender effects on physiological reactivity (Schneiderman, personal communication, May 16, 1990). The NCCOM 3 was interfaced to an IBM PS/2 Model 50 Z computer using a fifteen foot long RS-232 cable. Incoming raw data was stored on a hard disk drive and also output to a Star NX-1500 printer, as a backup measure. ProComm Plus was used to generate a script file that ran the data program and created a log storage file (Data Storm, Inc.).

Appendix 2 contains the script file.

Video Game Cassette. Participants played "Super Mario Brothers", a challenging Nintendo video game requiring speed and dexterity. The object of the game is to safely propel Mario through an obstacle course to save the princess. Subjects were told that,

The object of Super Mario Bothers is to quickly move Mario though an obstacle course to free the Princess. The direction of the buttons on the controller match the direction Mario will move. The A button makes Mario jump and the B button makes Mario go faster. Speed is associated with intelligence and motivation to acheive. Some groups of people do better on speed tasks than others. Prove yourself! Prove that you are faster and smarter than the rest of the subjects in the experiment". You will have five minutes to move Mario to the Princess before your time runs out.

These instructions were thought to provide a challenge to the participant. A kitchen timer with a bell was placed in viewing range of the subject and was set for five minutes.

Film stimuli. The stimuli used in the study were composed of a total of three video taped film excerpts, approximately 2.5 minutes each in duration. The excerpts represented three stimulus conditions, neutral, racist and anger-provoking. Subjects were randomly assigned to one of three stimulus condition orders: 1) Racist, anger, neutral, 2) Anger, neutral, racist or 3) Neutral, racist anger. This random assignment was balanced across race. Appendix 1 contains the film instructions.

Description of the Film Scenes. The neutral scene consisted of a Cajun chef preparing bread pudding. The anger scene consisted of a scene from "Lean on Me" in which the assistant principal severely admonishes the principal concerning his egotistical attitude and poor treatment of staff members. The racist scene consisted of a scene from the "The Color Purple" in which the mayor's wife makes various patronizing remarks based on race toward Sophia, a Black woman.

Mood checklist. The mood checklist contained words describing various moods, including anger. It was constructed for use in this study. This list was utilized as a self-report measure assessing the presence or absence of state anger associated with each stimulus condition. Six words associated with various emotions (1. depressed, 2. angry, 3. happy, 4. bored, 5. peaceful and 6. afraid) were presented in counterbalanced order for each stimulus condition. For each word, subjects were instructed to circle the number of the moods that best describes how they felt when they saw each scene. The checklist was structured using a three point Likert-type format of 1) very, 2) somewhat and 3) not at all. These choices were preceded by the

leading statement, when I watched the first/ second/ third/ scene, I felt....

The complete mood checklist is presented in appendix 1.

Interview. A 5 minute interview assessing experience with racism was designed for use in this study. There are currently no stress interviews that address stress brought about by racism. Interviews have been found to elicit physiological reactivity greater than or equal to that of standard stress tests (Dimsdale et al, 1984; Ironson, Gellman, Spitzer, Llabre, Pasin, Weidler and Schneiderman, 1989; Tischenkel, Saab, Schneiderman, Nelesen, Pasin Goldstein, Spitzer, Woo-Ming and Weidler, 1989; Wolf, and Wolff, 1951). In addition to functioning as a stressor, this interview also provided important information with which to compare emotional-coping styles to perceived discrimination among Black and White women. This interview was audiotaped. The contents of the interview are presented in Appendix 1.

Interview rating checklist. Anger content and stress content during the interview was scored by a rater unaware of any of the experimental questions regarding race or anger coping using a five point format. One experimenter who was blind to the experimental hypotheses, scored interviews for: 1) type of discrimination experienced, 2) verbal statements of anger, hostility toward men or Whites, 3) desire to retaliate, 4) perceived control over the situation, 5) loudness, 6) potential for hostility and 7) anger suppression. See Appendix 1.

Questionnaires. When participants arrived at the Psychophysiology Laboratory, they brought the completed packet of questionnaires. While the physiologically testing proceeded, a trained assistant examined each questionnaire carefully for missing data so that this could be remedied

before the participant left the laboratory. The questionnaire packet contained the following testing instruments:

1. Demographic and Health Status Form
2. AX Scale
3. Framingham Anger Scales
4. Cook-Medley Hostility Scales
5. Dean Alienation Scale
6. Desire for control Scale
7. Rotter's Locus of Control Scale
8. Cultural Mistrust Scale

Demographic and Health Status Form. A set of questions were assembled for use in this study obtained information about age, socioeconomic status, health, menstrual history and family history of hypertension.

Framingham Scales. Four anger scales from a twenty scale questionnaire administered to participants in the Framingham Heart Study (Haynes, et al., 1978) were utilized in this study. The series of scale questions was preceded by the stem "When you are angry or annoyed, how likely are you to...." The first anger scale, the anger symptoms scale, assessed somatic manifestations of anger and consisted of five items. Its reliability is reported as .74 and it demonstrates an interscale correlation of .34 with the Framingham Type A scale. The other three anger-related Framingham scales had too few items for accurate reliability computations. The 3 item anger-in scale does, however, show a negative inter-scale correlation to the two item anger-out scale ($r = .20$, $p < .01$). The two item anger-discuss scale examines interpersonal behavior such as, discussing anger with a friends. These scales have been found to be correlated with blood pressure measures in much the same manner as other anger measures (Haynes, et al., 1978; Diamond, et al., 1984; Armstead, et al., 1989).

The Anger Expression Scale. The 24 item AX Scale (Spielberger, et al., 1984) has a reliability of .73 to .84. This instrument consists of Anger-in (AXIN), Anger-out (AXOUT), Anger-control (AXCON) and total Anger-Expression (AXEX) subscales. The sum of the three subscales yields a total anger expression score (AXEX) which assesses how often people express, suppress and control anger as a global anger expression index. The three AX subscales assess individual differences in tendencies to 1) express anger toward other people or objects in the environment (Anger-out), 2) experience, but hold in angry feelings (Anger-in), and 3) control the expression of anger (Anger-control). The Anger Expression Scale has been tested among both Black and White women, as well as men, as well as being related to cardiovascular measures (Spielberger, Johnson, Russell, Crane, Jacobs, and Worden, 1985; Johnson, Schork, and Spielberger, 1987; Johnson, Spielberger, Worden, and Jacobs, 1987; Armstead, et al., 1989).

Dean Alienation Scale. The Dean alienation scale was designed to measure alienation in society and consists of 24 items presented in a 5-choice, Likert-type scale ranging from strongly agrees to strongly disagree (Dean, 1961). Dean included three major subscale components in this measure of alienation: powerlessness, normlessness and social isolation. He defined these concepts as follows:

1. **Powerlessness** (9 items)-- an ability to control one's life or influence the outcome of one's behavior in society.
2. **Normlessness** (6 items)-- a feeling of loss of internal values to provide direction or the values that do exist are irrelevant to current society.
3. **Social isolation** (9 items)-- feeling lonely or separated from society.

Dean reported split-half reliabilities of .78 for the total Alienation scale, .78 for the Powerlessness subscale, .73 for the Normlessness subscale and .84 for the Social Isolation subscale. Factor analysis results showed that there were strong relationships among the three factors and that they were also highly correlated with the generalized factor of alienation (Alienation and Powerlessness, $r = .90$; Alienation and Normlessness, $r = .75$). The powerlessness subscale is of particular importance to the proposed study.

Desirability of Control Scale. The desirability of control scale (Burger and Cooper, 1979). was designed to measure individual differences in the general level of motivation to control the events in one's life. The Desirability of Control Scale has internal consistency (.80) and test-retest reliability (.75), as well as discriminant validity with Rotter's Internal-External Locus of Control Scale and the Marlowe-Crowne Social Desirability Scale.

Rotter Locus of Control Scale. (I-E Scale). The I-E Scale (Rotter, 1966) consists of 29 forced choice items and is scored in terms of the total number of external choices selected. A high score represents an external expectancy, and a low score an internal expectancy of reinforcement. Nationally obtained norms show externality as a score of 10 or above on the external scale (Rotter, 1996). External orientation has been shown to be related to hostility (Williams and Vantress, 1969). It has also been related to feelings of anti-white sentiment among Blacks (Crain and Weisman, 1972).

Cultural Mistrust Inventory. The Cultural Mistrust Inventory (Terrell and Terrell, 1981). The cultural mistrust inventory was developed to assess cultural mistrust among Blacks. Cultural mistrust was said to exist within

four domains: 1) Education and training, 2) Interpersonal relationships, 3) Business and work and 4) Politics and Law. The 48 item scale has a test/retest reliability of .86. The 48 items are presented in a 10 -choice, Likert-type scale ranging from not in the least agree to totally agree. It shows external validity in that subjects with a high exposure to racial discrimination have higher mistrust scores. High scores indicate high levels of racial mistrust and low scores indicate low levels of racial mistrust. Only Black participants in the proposed study received this scale.

Physiological Recording

Heart rate, cardiac output and stroke volume was recorded by eight Medex electrodes and measured by the NCCOM 3 bioimpedance device continuously during each stage of the protocol. Two pairs of electrodes were placed bilaterally five centimeters apart vertically on the subject's neck (the lowest on the base of the neck) and two pairs of electrodes were placed bilaterally five centimeters apart vertically on the axilla at the level of the xiphoid process. After the electrodes were applied, the patient's L value was determined from the chart accompanying the NCCOM 3. The L value is an estimate of thoracic length. This parameter allows the device to make individualized calculations of changes in thoracic bioimpedance. "To produce accurate readings, the NCCOM must receive a clear QRS of the ECG signal for each heart beat" (Bo-Med, 1986). To ensure that the heart beat is steady, the pulsating heart-shaped symbol on the front of the monitored was observed until it produced a steady pulsation. Next, the slow mode was selected on the front of the monitor. This mode allowed all acceptable data to be sent to a peripheral interface (RS-232 cable) every

twelve beats and ultimately to an IBM PS/2 computer with a hard disk drive. Using a ProComm Plus script file (Data Storm, Inc.) created by Micheal O'Neil (University of Tennessee, Computing Center) a log file of incoming data and concurrent times was compiled. This file was later cleared of output errors and quantified using Microsoft Word 4.0 (Microsoft, Inc). The NCCOM 3 (Bo-Med Medical Manufacturing Ltd, Irvine CA) is a continuous noninvasive thoracic bioimpedance monitor. The NCCOM 3 has been found to yield reliable and valid measures of cardiac output when compared to simultaneous Fick and thermodilution procedures (Appel, Kram, Mackabee, Fleming and Shoemaker, 1986; Appel, Bernstein, Curtis, Shoemaker, Kram and Fleming, 1987; Golvi, Teague, Prasad, harvey, Voyles, Olson, Schechter, and Thadani, 1988; Mattar, Baruzzi, Diament, Szynkier, Felipe, Aulur, Lage, Pileggi and Jatene, 1986).

Blood pressure was monitored by the Roche Model 1216 Arteriosonde automatic blood pressure monitor. An ultrasound detector covered with transmission gel (Burdick Corporation Lectrosonic Gel) was attached to an occluding cuff. After palpating the brachial artery on the nonpreferred arm of the subject, the cuff was placed over the upper arm so that the detector was over the artery. Inflation of the cuff was initiated by the monitor in the equipment room.

Procedure

Initially, subjects read the consent form and researchers answered any questions the subject had regarding the procedure. Subjects signed the consent form in the presence of the investigator and the investigator signed the form. Subjects were randomly assigned to one of 3 order conditions.

Next, the subjects were taken to the subject room where the Medex electrodes and blood pressure cuff were be applied. Appendix 1 contains an outline of the experimental procedure.

Once the equipment was in order, subjects were instructed to rest quietly for an initial rest period of 15 minutes. Heart rate cardiac output, stroke volume, were monitored continuously throughout all stages of the protocol. Blood pressure was taken during minutes 2, 7 11, 13 and 15 of the initial rest period. At the time of each blood pressure measure, times were written on the data sheet to be used in transforming the raw hemodynamic data. After the initial rest, subjects were given instructions concerning how to play the Nintendo game. Subjects played "Super Mario Brothers" for five minutes. Blood pressure was taken during minutes 2, 4 and 5 of "Super Mario Brothers". A five minute rest period followed. Blood pressure was taken during minutes 1,3 and 5 of the rest period.

The next part of the protocol involved viewing the film stimuli. The experimenter initially provided instructions to the participant. In these instructions the participant was told that she would view some film scenes and have blood pressure, heart rate, stroke volume and cardiac output readings taken during each scene. Appendix 1 contains the complete film instructions. Participants were informed that they would fill out a short checklist at the end of each scene. Participants were told that both oral and written instructions were provided by the videotape indicating when the scene was about to begin, when to complete the mood checklist and when to relax. The videotape provided instructions as follows:

1. "The scene is about to begin"
2. "Imagine yourself as _____ (description of character) in the scene. Get into what you are seeing and hearing. Feel what she feels. Become her."
3. The scene is about to begin
4. "Please complete the mood checklist"
5. "Please rest" After the five minute rest period, the instruction sequence begins again.

During each minute of the stimulus, blood pressure was taken. The mood checklist was completed after the presentation of each scene. After the mood checklist had been completed, a five minute rest period followed, during which the participant was instructed to relax. Blood pressure was taken at minutes 1, 3 and 5 of the rest period. The remaining two segments were then presented, using an identical procedure. As a qualitative assessment of stress due to discrimination, participants were asked to participate in a five minute interview. Blood pressure were measured during each minute of the interview. This interview was followed by a five minute final rest period. Blood pressure was taken at minutes 1, 3 and 5 of the rest period. After the final rest period, the experimenter returned and removed the electrodes and blood pressure cuff. Subjects were verbally debriefed and any questions regarding the nature of the research were addressed. An indication of the participant's initial baseline blood pressure was provided.

Hemodynamic Data Transformation

Raw data was examined for output errors using Microsoft Word 4.0. After errors were remedied, hemodynamic data was transformed into intervals corresponding to the times during which blood pressures were taken and means were computed using CRUNCH statistical program.

These means were entered onto data sheets and provided that data for each experimental period (i.e. rest, films, video game and interview).

Formulas.

Several of the impedance derived hemodynamic variables needed additional calculations to allow for standardized comparisons of subjects of varying heights and weights. The next section provides the formulas from which these computations were derived.

Body Mass Index. Weight and height were transformed into the body mass index using the following formula:

$$\text{BMI} = \text{weight divided by height squared} \times 100.$$

Body Surface Area. Hemodynamic variables (stroke volume, cardiac output and total peripheral resistance) are traditionally indexed by body surface area to account for weight and height differences among subjects to may affect these variables (Milnor, 1982). Body surface area (BSA) which is expressed in meters squared, was computed using the following formula:

$$\text{BSA} = (\text{Ht [inches]} \times 2.54)^{0.725} \times (\text{Weight [lbs]} / 2.2)^{0.425} \times 0.007184.$$

Mean Arterial Pressure. Mean arterial pressure (MAP) is expressed in mm Hg and was calculated using this formula:

$$\text{MAP} = \text{Diastolic pressure} + (\text{Systolic-Diastolic})/3$$

Cardiac Index. Cardiac output was indexed to allow comparison of measurements between subjects of different heights and weights. Cardiac Index is expressed in liters per minute per meter squared. The following formula was used to calculate the cardiac index:

$$\text{Cardiac Index} = \text{Cardiac output} / \text{Body surface area}.$$

Stroke Index. Stroke volume was indexed to allow comparison of measurements between subjects of different heights and weights. Stroke Index is expressed in milliliters per beat per meter squared. The following formula was used to calculate the cardiac index:

$$\text{Stroke Index} = \text{Stroke Volume} / \text{Body surface area.}$$

Indexed Total Peripheral Resistance. Total peripheral resistance indexed by body surface area (TPR) is expressed in dyne per seconds per meter² /centimeters⁵. Indexed total peripheral resistance is derived from the following formula, in which 80 represents a factor converting mmHg per min per liter to dyne per second per centimeters⁵:

$$\text{TPR} = \text{Mean Arterial Pressure} \times 80 / \text{Cardiac Index}$$

Physiological Data Quantification

Rest. Blood pressure readings were taken during minutes 1,3, 5, 11, 13, and 15 of the first rest and during minutes 1,3, and 5 of five minute rest periods. Blood pressure readings were taken during minutes 1, 2, and 3 of the three rest periods between the film stimuli. These readings were averaged to provide one systolic blood pressure and diastolic blood pressure mean for each rest period. These averaged readings were converted to mean arterial pressure scores to be used in the calculation of total peripheral resistance. Mean arterial pressure (MAP) is defined as the average pressure tending to push blood through the systemic circulatory system (Guyton, 1980).

Heart rate, cardiac index, stroke index and total peripheral resistance data from the NCCOM 3 were also quantified into one minute sums for each minute of rest. These sums were averaged for each period to provide

one mean for each rest period. Indexed total peripheral resistance is a function of MAP and cardiac index.

Video game. Blood pressure readings were taken during minutes 1, 3, and 5 of the "Super Mario Brothers" stressor. After preliminary data examination, systolic blood pressure and diastolic blood pressure readings for minutes 1, 3, and 5 were converted to mean arterial pressure scores. These MAP scores were averaged into a single mean arterial pressure score and were used along with cardiac index in the calculation of total peripheral resistance. Heart rate, cardiac index, and stroke index data during the "Super Mario Brothers" task were quantified into global sums for minutes 1 through 5 of task. Total peripheral resistance during the "Super Mario Brothers" task were calculated from the resulting cardiac index and mean arterial pressure score.

Stimulus Conditions. Blood pressure readings were taken during minutes 1, and 2 of each of the three film conditions. Heart rate, cardiac index, and stroke index data during each of the film stimuli were quantified into global sums for minutes 1 and 2. Total peripheral resistance during each of the film stimuli was calculated from the resulting cardiac index and mean arterial pressure score.

Interview. Blood pressure readings were taken during each minute of the five minute interview stressor. Heart rate, cardiac index, and stroke index data during the interview were quantified into global sums for minutes 1 through 5. Total peripheral resistance during the interview was calculated from the resulting cardiac index and mean arterial pressure score.

CHAPTER 6

RESULTS

Demographic Data

One of the primary foci of this study was the examination of racial differences in cardiovascular reactivity to racist stimuli. To ensure that our physiological measures of racial differences in responsivity were not contaminated by the interaction of racial differences in demographics or health status with blood pressure, we utilized independent groups *t*-tests to assess the equivalency of the two racial groups.

There were no significant differences between the groups. Blacks and Whites were similar across all the demographic and health variables (i.e. marital status, occupation, income, number of children, education level, age, height, weight, personal health, incidence of smoking and exercising regularly). The sample was composed of thirty-four Black and thirty-four White women approximately thirty five years in age. Approximately fifty percent of the sample were parents. Of the women who had children, 24.29% ($n = 17$) of the sample were single parents and 30.00% ($n = 21$) of the sample were married parents. Approximately fifty percent of the sample was not married at the time of testing. Only 4% of the subjects were unemployed; the remaining women worked in a variety of occupations, from service workers to academics and professionals. The mean income of the sample fell between \$20,000 and \$24,000 ($SD = 2.28$). Table 1 presents the demographic means for the sample.

Table 1

MEANS AND STANDARD DEVIATIONS FOR DEMOGRAPHIC VARIABLES BY RACE				
	<u>BLACKS</u>		<u>WHITES</u>	
	Mean	SD	Mean	SD
AGE	35.77	9.71	32.33	8.56
HEIGHT (CM)	163.48	7.24	164.02	5.79
WEIGHT (KG)	74.60	20.26	67.78	17.25
BODY MASS INDEX (cm ²)	27.97	7.62	25.33	7.24
MARITAL STATUS	2.70	1.43	2.82	1.29
OCCUPATION	6.06	2.47	5.85	2.44
YEARLY INCOME	4.33	2.46	4.03	2.14
EDUCATION (years)	16.64	2.77	16.32	3.40
NUMBER OF CHILDREN	1.09	0.95	1.00	1.30

Health Status

Information concerning the prevalence of health problems among the subjects was obtained from the health and demographics form. Forty-one subjects reported having no health problems. Eight subjects reported being hypertensive. Five of the hypertensive subjects were being pharmacologically treated. Two Black subjects were being treated with calcium channel blockers and diuretics. A third Black subject had a prescribed program of pharmacotherapy, but did not know the name of the medicine. A White subject had been treated with a beta-blocker, but was not on this drug at the time of testing. Another White subject received an angiotensin converting enzyme suppressor, but had not taken the drug on the day of testing. Thus, incidence of hypertension and drug therapy were balanced across racial groupings and therefore inclusion of these hypertensives in the study was acceptable. Nine subjects reported being diabetic. Seven of these subjects were white and two were Black. One of the White diabetic subjects reported insulin therapy.

Family History of Hypertension

Family history of cardiovascular-related diseases was also assessed. Individuals who reported maternal, paternal or dual incidences of family history were categorized as family history positive. Individuals reporting no family history of hypertension were categorized as family history negative. It was found that 41.18% of the sample had no family history of hypertension and 58.82% were positive for family history. Of the members of sample possessing a positive family history of hypertension, 32.84% had a family history of maternal hypertension, 19.40% had a paternal family history of hypertension and 5.97% had a dual parental

history of hypertension. There were no racial differences in the percentage of subjects with positive family histories of hypertension (χ^2 (1 df) = 0.0607, $p < 0.81$).

A series of one-way ANCOVAs with the body mass index as a covariate were performed separately for each race with systolic, diastolic and mean arterial pressures during rest, the three film scenes, the video game challenge and the interview as dependent variables. It was found that there were no systolic, diastolic or mean arterial resting blood pressure differences in family history of hypertension among either race. It was that found among Blacks, but not Whites, that Black subjects with a positive family history of high blood pressure had higher blood pressures than Blacks with negative family histories of hypertension for several task measures. Diastolic blood pressure during the racist scene was significantly higher for Black subjects who were family history positive ($M = 89.93$) than for Black subjects who were family history negative ($M = 79.71$), ($F(33,1) = 5.23$, $p < .03$). Diastolic blood pressure during the racist film scene was the only passive coping condition that enabled family history differences among either race to be discerned. Family history differences were even more notable in the results of analyses conducted for diastolic and mean arterial pressure during the video game challenge. Family history positive Blacks had higher diastolic blood pressure ($M = 93.27$) when playing the video game than family history negative Blacks ($M = 80.39$), ($F(33,1) = 11.82$, $p < .002$). Mean arterial pressure during the video game challenge was also significantly higher for Blacks with a positive family history of hypertension ($M = 107.41$) than for Blacks who did not have a family history of hypertension ($M = 95.95$), ($F(33,1) = 11.82$, $p < .002$). This would suggest that perhaps this type of active coping task elicits a pressor response that may be carried by a genetic response predisposition.

Order effects: Film stimuli

Subjects were randomly assigned to view three film stimuli in one of three presentation orders: 1) Racist, anger, neutral, 2) Anger, neutral, racist, or 3) Neutral, racist, anger. As a test of unwanted experimental order effects, a series of $2 \times 3 \times 4$ repeated measures ANCOVAs was performed for mean arterial, diastolic and systolic pressures. Body mass index served as a covariate. Systolic pressure analyses indicated that there were no main effects for race or order. There was a repeated measures effect ($F(3,204) = 22.57, p < .0001$). There were no interactions between race and repeated measures or order and repeated measures. We can conclude that any systolic pressure effects discussed in the following sections were not a result of the order of presentation of the film stimuli. There was a main effect for race when analyzing diastolic pressure ($F(2,67) = 4.12, p < .05$, G-G, $p < .0001$). Race did not interact with repeated measures. There was no main effect for scene order or interaction effects for scene order and race or repeated measures. There was a diastolic repeated measures effect ($F(3,204) = 9.22, p < .0001$, G-G = $p < .004$). Mean arterial pressure analyses indicated that there were no main effects for race or order. There was a repeated measures effect ($F(3,204) = 20.79, p < .0001$). There were no interactions between race and repeated measures or order and repeated measures. From the preceding analyses, it is safe to conclude that the order of scene presentation had no effect on blood pressure.

Cardiovascular Responses to Film Stimuli

A series of Lindquist Type I repeated measures analyses of covariance (Huck, Cormiear and Bounds, 1982) were performed to detect racial differences and differences in resting blood pressure and responsivity to the three film scenes: neutral, anger-provoking and racist. Body mass index was used as a covariate

throughout these analyses. In Tukey-B planned comparisons, blood pressure during rest was compared to blood pressure during the three stimulus conditions. Blood pressure levels during the film stimuli were also compared to each other. Refer to appendix 3 for figures discussed in the following sections.

Systolic Blood Pressure. After covarying out the effects of body mass index, there were no racial differences found for overall systolic blood pressure ($F(1,67) = 1.98$, $p < .16$). There were significant repeated measures effects for the film scenes ($F(2,134) = 22.27$, $p < .0001$, G-G, $p < .0001$). Also, there were no interactions between race and repeated measures. Tukey-B post hoc analyses applied to the blood pressure means indicated that the responses to the anger-provoking and racist scenes were significantly larger than to the neutral scene and to rest ($p < .01$). Responsivity to the anger and racist scenes were not significantly different. Comparison of the neutral scene and rest also yielded nonsignificant results.

Diastolic Blood Pressure. A between-groups racial difference was found for overall diastolic blood pressure ($F(1,67) = 4.38$, $p < 0.04$). Blacks had significantly higher overall diastolic pressures than Whites, ($M = 83.10$, $SD = 11.41$ and 77.67 , $SD = 8.89$, respectively). Furthermore, the analyses indicated that there were significant repeated measures effects for the film scenes ($F(3,204) = 9.43$, $p < .0001$, G-G, $p < .003$). There were no interactions between race and repeated measures ($F(3,204) = 1.58$, $p < .19$, G-G, $p < .12$). Tukey-B post hoc analyses indicated that responsivity to the anger-provoking and racist scenes were significantly greater than to the neutral scene and to rest. As with systolic pressure, responsivity to the anger-provoking and racist scene were not significantly different. Again, there was no significant difference between rest and the neutral scene.

Mean Arterial Pressure. Mean arterial pressure followed a similar pattern ($F(1,67) = 3.67, p < 0.06$), with a nonsignificant trend toward Blacks having higher mean arterial pressures than Whites, ($M = 95.30, SD = 11.37$ and $M = 89.57, SD = 9.40$) respectively. There was a significant repeated measures effect ($F(3,204) = 21.21, p < .0001, G-G p < .0001$). Tukey-B post hoc analyses indicated that responsivity to the anger-provoking and racist scenes was significantly greater than to the neutral scene and to rest ($p < .01$). Similarly, rest was not significantly different from the neutral scene. The pattern of mean arterial pressure differed from diastolic and systolic pressure patterns in that responsivity to the racist scene was significantly greater than to the anger scene for mean arterial pressure ($p < .05$). There were no interactions between race and repeated measures ($F(3, 204) = 1.477, p < .22, G-G, p < .23$).

While race by repeated measures interactions were not significant, means from Figures 1-3 suggest racially different patterns of reactivity to the three film stimuli as compared to themselves and to rest. Derived from a priori predictions about racial differences, based on an earlier study (Armstead, et al, 1989), one way repeated measures of analyses of variance were performed separately for each race. For all analyses, resting blood pressure and blood pressure during the neutral stimulus were equivalent.

Systolic blood pressure for each race. White subjects showed a repeated measures effect for systolic blood pressure ($F(3,102) = 8.00, p < .0001, G-G p < .01$). Tukey-B post hoc analyses showed no differences in responsivity to racism and anger-provoking scenes. Comparisons of each of these scenes to the neutral scene both indicated that anger and racism produced greater responsivity to these scenes than to the neutral scene ($p < .01$). Similarly, Blacks demonstrated a repeated measures

effect for systolic blood pressure ($F(3,102) = 16.63$, $p < .0001$, G-G $p < .0003$).

Responsivity to the racist and anger-provoking scenes was also greater than to resting values ($p < .01$). However, Black subjects were more responsive to the racist scene than to the anger provoking scene ($p < .05$).

Diastolic blood pressure for each race. For diastolic pressure, among White subjects a repeated measures effect occurred ($F(3,102) = 4.31$, $p < .01$, G-G $p < .05$). The Tukey B analyses yielded p levels of $p < .10$, which did not reach our criterion for significance, so we rejected the assumption that there were differences between the films or rest. These nonsignificant differences between stimuli may have cumulatively produced a significant repeated measures effect. This indicated that Whites did not experience a diastolic pressor response to the film stimuli. Blacks, however, showed a significant repeated measures effect for diastolic blood pressure ($F(3,102) = 6.87$, $p < .0003$, G-G $p < .01$). Tukey-B post hoc analyses demonstrated significant differences in responsivity to racism versus anger-provoking stimuli, among Blacks, with racist stimuli producing greater responsivity than anger-provoking stimuli ($p < .05$). Responsivity to the neutral stimulus was significantly less than responsivity to the racist and anger provoking scenes ($p < .01$), and equivalent to rest.

Mean arterial blood pressure for each race. For White subjects mean arterial pressure followed a pattern similar to systolic pressure. They showed a significant repeated measures effect for mean arterial blood pressure ($F(3,102) = 8.92$, $p < .0001$, G-G $p < .005$). Tukey-B post hoc analyses showed no differences in responsivity to racism and anger-provoking scenes among White subjects. Responsivity to these two stimuli were however both greater than to the neutral stimulus or to rest ($p < .01$). Rest and the neutral stimulus were not significantly

different. Blacks also showed a repeated measures effect for mean blood pressure ($F(3,102) = 14.24$, $p < .0001$, G-G $p < .001$). Tukey-B post hoc analyses showed that responsivity to racism was significantly greater than responsivity to anger-provoking scenes among Blacks ($p < .01$). These analyses also showed responsivity to the neutral scene that was significantly less than to the racist and anger-provoking scenes ($p < .01$, $p < .05$,) respectively. Responsivity to the neutral scene was equivalent to rest.

The data obtained from these follow-up analyses seem to indicate that even after controlling for racial differences in body mass, there remains a differential pattern of responsivity to racial stressors among Black and White women. Blacks appear to be more responsive to film stimuli depicting racism than to anger provoking stimuli, while Whites respond to anger-provoking and racist film stimuli equally and do not tend to show diastolic pressor responses.

Cardiovascular Mechanisms Related to Blood Pressure During the Film Stimuli.

Cardiac output, stroke volume and total peripheral resistance were indexed to control for the strong relationship of these variables to body weight. Heart rate is basically unrelated to weight and was therefore not indexed. After obtaining indexed values, exploratory analyses were performed on the four cardiovascular variables thought to be hemodynamically related to the blood pressure response during the racist stimulus. A series of Lindquist Type I repeated measures analyses of covariance (Huck, Cormiear and Bounds, 1982) were performed to ascertain racial differences and differences in resting blood pressure and responsivity to the three film scenes: neutral, anger-provoking and racist. Body mass index was used as a covariate throughout these analyses. In Tukey-B planned comparisons, levels of hemodynamic variables during rest were compared to levels during the three stimulus

conditions. Hemodynamic variable levels during the film stimuli were also compared to each other.

Total Peripheral Resistance. There was a significant racial difference between Black and White subjects, with Blacks having higher overall peripheral resistance ($M = 2987.05$, $SD = 861.22$) than Whites ($M = 2493.25$, $SD = 792.37$) ($F(1,66) = 6.12$, $p < .02$). There was also a significant repeated measures effect ($F(3,201) = 14.09$, $p < .0001$, G-G $p < .0004$). Tukey-B post hoc analyses indicated that both the anger producing stimulus and the racist stimulus produced increases in peripheral resistance that were significantly greater than the neutral stimulus ($p < .05$, $p < .01$), respectively. Peripheral resistance was not significantly different between the anger and racist stimulus. Similarly, rest was not different from the neutral stimulus. There was no interaction between race and repeated measures ($F(3,201) = 1.37$, $p < .25$, G-G $p < .25$).

Cardiac output. Cardiac output was not significantly different between Black and White subjects ($p < .09$). There was however, a non-significant repeated measures effect ($F(3,201) = 3.62$, $p < .01$, G-G, $p < .06$). Tukey B post hoc analyses indicated that cardiac output during all three stimuli decreased similarly from resting values ($p < .05$). There was no interaction between race and repeated measures ($F(3,201) = 1.23$, $p < .30$, G-G $p < .27$).

Stroke volume. Stroke volume was unresponsive to the film scenes ($F(3, 201) = .90$, $p < .30$, G-G, $p < .27$). There were neither between ($F(1,66) = .45$, $p < .51$) or within subjects main effects for stroke volume ($F(3, 201) = .90$, $p < .30$, G-G, $p < .27$). There was no interaction between race and repeated measures ($F(3,201) = 1.67$, $p < .17$, G-G $p < .20$).

Heart Rate. Heart rate means were not significantly different between the two races ($F(1,67) = 1.73, p < .19$), however, these means differed significantly within subjects. There was a significant repeated measures effect for heart rate ($F(3,204) = 3.67, p < .01, G-G p < .06$). Tukey-B analyses indicated a significant effect for the comparison of heart rate during rest ($M = 76.01, SD = 9.90$) and heart rate during the neutral scene ($M = 74.57, SD = 9.51$), $p < .01$). Heart rate during the neutral scene decreased from resting values and heart rate during the other two scene remained similar to rest. There was no interaction between race and repeated measures ($F(3,204) = .5, p < .66, G-G p < .47$).

While race by repeated measures interactions were not significant, means from Figures 4-7 suggest racially different patterns of reactivity to the three film stimuli as compared to themselves and to rest. Based on a priori predictions about racial differences, and blood pressure based on an earlier study (Armstead, et al., 1989), repeated measures of analysis of variance were performed separately for each race on indexed values of the four hemodynamic variables: Cardiac output, total peripheral resistance, heart rate and stroke volume.

Total Peripheral Resistance. White subjects showed a different pattern of peripheral responsivity than Blacks. For Whites, the within subjects F test for differences among rest and the three film scenes was highly significant ($F(3,99) = 10.32, p < .0001, G-G p < .003$). To test for pairwise differences among these variables, Tukey-B analyses were performed. They indicated that rest was not different from total peripheral resistance during the neutral scene, but the anger and racist scenes were both greater than the neutral scene for White subjects. There was no differences between the anger and racist scenes for this group.

For Blacks, there was also a highly significant repeated measures effect ($F(3,102) = 6.47, p < .0005, G-G < .02$). However, Tukey analyses revealed that only the racist scene was significantly greater than the neutral scene ($p < .05$) or rest ($p < .01$). There was no significant difference found between the racist scene and the anger-provoking scene ($p < .10$). A more liberal post hoc test of means, the Neuman-Keuls test, indicated that the response to the racist scene was in fact significantly larger than to the anger scene ($p < .05$).

Cardiac output. For Whites, there was a significant repeated measures effect for cardiac output ($F(3,99) = 5.089, p < .003, G-G p < .03$). Post hoc analyses for the White subsample indicated that resting cardiac output was greater than during the racist stimulus ($p < .05$), during the anger-provoking stimulus ($p < .01$), or during the neutral stimulus ($p < .05$). There was no significant difference between the means for the three film scenes, however. Blacks showed no repeated measures effect for cardiac output. White subjects responded to the three scenes with a global decrease in cardiac output.

Stroke volume. There was a repeated measures effect for White subjects ($F(3,99) = 4.46, p < .01, G-G p < .04$). It was found in Tukey post hoc analyses that resting stroke volume values for Whites were significantly greater than during the anger stimulus ($p < .01$). Stroke volume during the anger stimulus was also less than during the racist stimulus ($p < .05$). Stroke volume during rest and the racist and neutral stimuli were not different among the White subsample. Regarding stroke volume, Blacks were totally unresponsive to the three film stimuli. All measures of stroke volume during the three films were equivalent to resting stroke volume levels. White's stroke volume did not deviate from resting values for the neutral and racist film

scenes and decreased during the anger scene. Blacks remained unresponsive to the films in regard to this variable.

Heart Rate. Heart rate was not different for either race across repeated measures.

Cardiovascular Responses: Relation to Mood Self Report

The mood checklist provided a manipulation check of the affective content of the three film stressors used in this study. The adjectives listed on the mood checklist were: angry, afraid, happy, depressed, or bored. They were rated on a three point scale of: 1) not at all, 2) somewhat, and 3) very. The mood checklist enabled us to assess whether the racist and anger-provoking films were producing an angry mood. Because this mood checklist has not been used previously in conjunction with the stressors in this study and a bi-racial sample, we could not make hypotheses concerning any analyses. To test if there were differences between Blacks and Whites in their adjective ratings of the racist scene that were greater than chance, Chi-Square tests were performed. It was found that there were no racial differences in ratings of anger, depression, happiness and boredom during the racist scene, the anger scene and the neutral scene. All participants reported moods other than anger and fear after viewing neutral stimulus. Self reports of boredom during the neutral scene were fairly high with 38.24% of the subjects reporting being somewhat bored and 16.18% of the subjects reporting being very bored. Three subjects reported feeling somewhat depressed during the neutral scene and one subject reported feeling very depressed during this scene. The majority of the subjects were not depressed during this scene (94%). In fact, a large proportion of the respondents felt very happy (47.06%) and somewhat happy (17.65%). Important to the research questions of this study were self reports of the degree of state anger on the mood checklist. The frequency of Blacks reporting being very angry was 31 and

the frequency of Whites reporting being very angry was 32. It was found when examining the results of Blacks and Whites together that 7.35% reported being somewhat angry and 92.65% of the sample reported being very angry. Reports of fear were found to be significantly different between Blacks and Whites during the racist scene. Blacks (68.97%) were more likely to report being not at all afraid during the racist scene than were White subjects (31.03%) (χ^2 (2 df) = 7.51, $p < .02$). There were no racial differences in self reports of anger during the anger-provoking scene with 63.24% of both races combined reporting being very angry and 27.94% reporting feeling somewhat angry. Only six subjects reported feeling not at all angry. Because it appeared that a larger percentage of the subjects reported being very angry during the racist scene than during the anger-provoking scene, a paired differences t-test was performed for the anger ratings means for the anger-provoking and racist stimuli. Subjects were more angry during the racist scene ($M = 2.93$, $SD = .26$) than during the anger-provoking scene ($M = 2.54$, $SD = .66$), ($t = -4.56$, (67 df), $p < .0001$). Blacks were more likely to report feeling not at all afraid during the racist scene than were Whites ($\chi^2 = 6.30$, $p < .04$).

Pearson product-moment correlations were subsequently performed between systolic, diastolic and mean arterial blood pressures after the racist stimulus and mood ratings for the racist scene to assess the relationship between mood and blood pressure. Among Whites, mood ratings were not associated with systolic, diastolic or mean arterial blood pressure measures during the racist scene. For Black subjects, increased self-reports of outwardly directed anger were associated with lower systolic diastolic and mean arterial blood pressures. Fear was also inversely associated with diastolic pressure. Anger was related to a general systolic, diastolic and mean arterial activation, while fear was associated with a diastolic pressure

response. See Table 2. It appears that for Blacks, the opportunity to acknowledge and report negative emotional states on the mood checklist was associated with lowered responsivity to noxious film stimuli.

Cardiovascular responses: The Video Game

As a traditional cognitive stressor, video game challenge was found to induce significant increases in systolic, diastolic and mean arterial blood pressure levels. A series of Lindquist Type I analyses of covariance (Huck and Bounds, 1977) were performed to compare levels of blood pressure during the video game challenge to resting blood pressure levels. Race was the between subjects factor. The body mass index was used as a covariate, to control for the effects of weight and height on blood pressure. Where graphic patterns suggested a racial difference or a non-significant interaction of race and repeated measures occurred, one way repeated measures ANOVAs were performed for each race separately.

Systolic Blood Pressure. Levels of systolic blood pressure during the video game challenge were compared to levels during rest. After covarying for the effects of body mass index, it was found that there were no racial differences for overall systolic blood pressure; however, there were repeated measures effects for rest and the task ($F(1,68) = 134.54, p < .0001$, G-G, $p < .0001$). There was no interaction between race and repeated measures ($F(1,68) = 4.23, p < .52$, G-G $p < .52$).

Diastolic Pressure. Upon analyzing diastolic blood pressure, it was found that there were racial differences in diastolic blood pressure between Blacks

Table 2

PEARSON CORRELATIONS AND P-VALUES FOR MOOD AND BLOOD PRESSURE MEASURES

BLOOD PRESSURE DURING RACIST FILM SCENE

BLACK SUBJECTS

<u>MOOD</u>	Systolic	Diastolic	Mean Arterial
Anger	-.48 .01	-.39 .02	-.48 .01
Fear	-.20 .02	-.35 .05	-.31 .07

BLOOD PRESSURE DURING RACIST FILM SCENE

WHITE SUBJECTS

<u>MOOD</u>	Systolic	Diastolic	Mean Arterial
Anger	-.06 .73	-.01 .99	-.03 .86
Fear	-.01 .99	-.09 .60	-.05 .76

and Whites ($F(1,67) = 5.6$, $p < .02$) with Blacks ($M = 85.39$, $SD = 11.20$) having higher overall pressures than Whites ($M = 78.93$, $SD = 10.89$). Race and repeated measures did not interact. Diastolic blood pressure during the video game challenge was significantly greater than during rest for both races ($F(1,68) = 17.62$, $p < 0.0001$, G-G $p < .0001$). Race and repeated measures failed to interact. There was no interaction between race and repeated measures ($F(1,68) = 0.03$, $p < .86$, G-G $p < .86$).

Mean Arterial Blood Pressure. After covarying for the body mass index, there were main effects for race, with Blacks ($M = 98.48$, $SD = 11.50$) having higher mean arterial pressure than Whites ($M = 92.53$, $SD = 10.88$), ($F(1,67) = 4.29$, $p < .04$). Mean arterial pressure during the video game was greater than resting levels ($F(1,67) = 38.55$, $p < 0.0000$, G-G $p < .0001$). Race and repeated measures failed to interact ($F(1,68) = 0.18$, $p < .67$, G-G, $p < .67$).

Cardiovascular Mechanisms Related to Blood Pressure During the Video Game

After obtaining indexed values, exploratory analyses were performed on cardiac output, stroke volume and total peripheral resistance. Lindquist Type I Anovas were performed separately for each race. Because each of the variables was indexed and heart rate is unrelated to weight, it was unnecessary to use the body mass index as a covariate. Where graphic patterns suggested a racial difference or a nonsignificant interaction of race and repeated measures occurred, one way repeated measures ANOVAs were performed for each race separately.

Total Peripheral Resistance. There was a significant racial difference between Black and White subjects, with Blacks having higher overall peripheral resistance ($M = 2935.52$, $SD = 906.93$) than Whites ($M = 2479.29$, $SD = 797.79$) ($F(1,67) = 5.27$, $p < .03$). There was also a significant repeated measures effect ($F(1,68) = 13.55$, $p < .0005$, G-G $p < .0005$). Resting total peripheral resistance ($M = 2603.02$, $SD =$

914.68) was significantly lower than total peripheral resistance during the video game ($\underline{M}$ = 2811.79, $\underline{SD}$ = 840.16). There was a trend toward an interaction effect between racial groups and repeated measures ($\underline{F}(1,68) = 3.43$, $p < .07$, G-G $p < .07$). To test this effect further, within subjects analyses of variance were performed separately for each race. For White subjects, it was found that there was a more highly probable statistical difference between resting peripheral resistance and resistance during the video game ($\underline{F}(34,1) = 9.63$, $p < .004$) than for Blacks ($\underline{F}(34,1) = 4.07$, $p < .05$).

Cardiac output. Cardiac output during the video game was not significantly different between Black and White subjects ($\underline{F}(1,66) = 1.06$, $p < .31$, G-G, $p < .31$). There was also a nonsignificant trend toward a repeated measures effect ($\underline{F}(1,67) = 3.48$, $p < .07$, G-G, $p < .07$). Because there was a nonsignificant trend toward a repeated measures effect, further analyses were performed separately for each race. It was found that there was no difference between resting levels of cardiac output and cardiac output during the video game for Whites, but levels during the video game ($\underline{M}$ = 2.81, $\underline{SD}$ = .76) were greater than resting levels of cardiac output ($\underline{M}$ = 2.94, $\underline{SD}$ = .82) among Blacks ($\underline{F}(34,1) = 6.65$, $p < .02$). There was no interaction between race and repeated measures ($\underline{F}(1,67) = 2.62$, $p < .11$, G-G $p < .11$).

Stroke volume. Stroke volume for both Blacks and Whites was unresponsive to the video game stressor. There were neither racial ($\underline{F}(1,67) = 1.981$, $p < .16$, G-G, $p < .16$) or repeated measures main effects for stroke volume ($\underline{F}(2,134) = 22.01$, $p < .0001$, G-G, $p < .0001$). There was no interaction between race and repeated measures ($\underline{F}(1,67) = 0.17$, $p < 0.68$, G-G $p < 0.68$).

Heart Rate. Heart rate means were not significantly different between the two races ($F(1,67) = 0.76$, $p < 0.39$, G-G, $p < 0.39$), however, these means differed significantly between intervals ($F(1,68) = 26.00$, $p < .0001$). Heart rate was higher during the video game ($M = 80.02$, $SD = 10.33$) than during rest ($M = 76.01$, $SD = 9.90$). There was no interaction between repeated measures and race ($F(1,68) = 2.60$, $p < 0.11$, G-G, $p < 0.11$).

Cardiovascular Responses: The Interview

The following analyses addressed the question of whether discussion of personal discrimination produces blood pressure increases and whether such increases are similar for Black and White women. They were conducted with body mass index as a covariate and with race as a between subjects factor. Blood pressure during the interview was compared to blood pressure during rest. Where graphic patterns suggested a racial difference or a nonsignificant interaction of race and repeated measures occurred, one way repeated measures ANOVAs were performed for each race separately.

Systolic Pressure. There were no racial differences in overall blood pressure between Whites and Blacks. Systolic blood pressure during the interview was significantly higher than resting systolic blood pressure levels ($F(1,67) = 157.23$, $p < 0.0000$, G-G $p < .0001$). There were no interactions between race and repeated measures ($F(1,68) = 1.13$, $p < 0.29$, G-G, $p < 0.29$).

Diastolic Blood Pressure. Even after controlling for the body mass index, there was a main effect for race, with Blacks having higher diastolic blood pressure than White subjects ($F(1,67) = 7.11$, $p < .010$). Furthermore, diastolic blood pressure during the interview was significantly higher than resting levels ($F(1,67) = 59.09$, $p < 0.0000$, G-

G $p < .0001$). There were no interactions between race and repeated measures ($F(1,68) = 0.003$, $p < .96$, G-G, $p < .96$)

Mean Arterial Blood Pressure. For mean arterial pressure during the interview, there was a significant main effect for race with Blacks ($M = 99.55$, $SD = 12.30$) having higher overall blood pressure than Whites ($M = 92.79$, $SD = 10.45$) ($F(1,67) = 5.95$, $p < .02$). Mean arterial pressure was increased from resting levels during the interview ($F(1,68) = 77.782$, $p < 0.0001$, G-G $p < .0001$). There were no interactions between race and repeated measures ($F(1,68) = 0.16$, $p < 0.70$ G-G, $p < 0.70$).

From these findings, it can be said that the discussion of personal discrimination increases systolic, diastolic and mean arterial blood pressure from resting levels. These effects are racially divergent only for mean arterial and diastolic pressures. Thus for diastolic and mean arterial pressure, Blacks had higher overall pressure levels during rest and the task.

Cardiovascular Mechanisms Related to Blood Pressure During the Interview

Exploratory analyses were performed on indexed levels of cardiac output, stroke volume and total peripheral resistance. Lindquist Type I Anovas were performed separately for each race. Because each of the variables was indexed and heart rate is unrelated to weight, it was unnecessary to use the body mass index as a covariate. Where graphic patterns suggested a racial difference or a nonsignificant interaction of race and repeated measures occurred, one way repeated measures ANOVAs were performed for each race separately.

Total Peripheral Resistance. For total peripheral resistance during the interview, there was a significant racial difference between Black and White subjects, with Blacks having higher overall peripheral resistance ($M = 3038.63$, $SD = 823.24$) than Whites ($M = 2416.07$, $SD = 823.24$) ($F(1,67) = 10.86$, $p < .0016$). There was also a

significant repeated measures effect ($F(1,68) = 17.26, p < .0001$, G-G $p < .0001$). Resting total peripheral resistance ($M = 2603.02$, $SD = 914.68$) was significantly lower than total peripheral resistance during the interview ($M = 2851.68$, $SD = 822.92$). Although, there were no interaction effects for race or repeated measures ($F(1,68) = 1.05, p < 0.31$ G-G, $p < 0.31$), examination of the means indicates a racially different response pattern to the interview. To explore this possibility, one way analyses of variance were performed separately for each race. For White subjects, it was found that there was less of a difference between rest and the video game ($F(34,1) = 3.55, p < .07$) than for Blacks ($F(34,1) = 21.67, p < .0001$). Peripheral responsivity during the interview appears to be derived primarily from peripheral vasoconstriction among the Black subjects.

Cardiac output. Overall cardiac output during the interview and rest was not significantly different between Black and White subjects ($F(1,66) = 5.68, p < .08$). It appears that there is a nonsignificant trend toward White subjects ($M = 3.23$, $SD = .82$) having a higher total cardiac output than Blacks ($M = 2.87$, $SD = .79$). There were no repeated measures effects for levels of cardiac output during rest and the interview ($F(1,67) = 2.13, p < 0.15$ G-G, $p < 0.15$). There was no interaction between race and repeated measures ($F(1,67) = 2.13, p < .15$, G-G $p < .15$).

Stroke volume. Stroke volume for both Blacks and Whites was unresponsive to the the interview stressor. There were neither racial ($F(1,66) = 0.93, p < 0.34$ G-G, $p < 0.34$) nor repeated measures main effects for stroke volume ($F(1,67) = 0.56, p < 0.56$ G-G, $p < 0.4$). There was no interaction between race and repeated measures ($F(1,67) = 0.16, p < .69$, G-G $p < .69$).

Heart Rate. Heart rate means were not significantly different between the two races ($F(1,67) = 2.65, p < 0.11$ G-G, $p < 0.11$), however, these means differed significantly

within subjects ($F(1,68) = 13.21, p < .0006$). Heart rate was higher during the interview ($M = 78.23, SD = 9.37$) than during rest ($M = 76.01, SD = 9.90$). There was no interaction between race and repeated measures ($F(1,68) = 0.53, p < .47, G-G p < .47$).

The physiological results of this study depict a complex racially divergent pattern of responsivity to the many types of stressors used in this study. Table 3 presents a summary of the physiological effects of stressors involved in this study. These results are presented by experimental condition and race.

Table 3

SUMMARY OF PHYSIOLOGICAL RESPONSIVITY				
	RACE	FILM STIMULI	VIDEO GAME	INTERVIEW
SBP	Black	$B = N < A < R$	$B < V$	$B < I$
	White	$B = N < A = R$	$B < V$	$B < I$
DBP	Black	$B = N < A < R$	$B < V$	$B < I$
	White	$B = N = A = R$	$B < V$	$B < I$
MAP	Black	$B = N < A < R$	$B < V$	$B < I$
	White*	$B = N < A = R$	$B < V$	$B < I$
TPR	Black	$B = N = A < R$	$B < V$	$B < I$
	White	$B = N < A = R$	$B < V$	$B < I^*$
CO	Black	$B = N = A = R$	$B < V$	$B = I$
	White	$B > N = A = R$	$B = V$	$B = I$
SV	Black	$B = N = A = R$	$B = V$	$B = I$
	White	$B = N > A < R$	$B = V$	$B = I$
HR	Black	$B = N = A = R$	$B < V$	$B < I$
	White	$B = N = A = R$	$B < V$	$B < I$

LEGEND:

SBP= Systolic blood pressure.
 DBP= Diastolic blood pressure.
 MAP= Mean arterial blood pressure.
 TPR= Total peripheral resistance index.
 CO= Cardiac output index.
 SV= Stroke volume index.
 HR= Heart rate.

BF= Black female.
 WF= White female.

B= Baseline (rest).
 R= Racist stimulus.
 N= Neutral stimulus.
 A= Anger stimulus.

I= Interview.

V= Video game.

* approaches significance ($p < .06$).

Interview Ratings

The audiotaped interviews were rated along the following dimensions: potential for hostility, anger suppression, desire to retaliate, hostility directed toward members of the opposite race/gender and the type of discrimination discussed. It was found that 91.18% of the White subjects reported discrimination due to sexism, while 5.88% of Blacks reported this type of discrimination. For Whites, 8.82% of this group reported experiencing neither racism nor sexism. Only 5.88% of the Black subjects reported experiencing neither racism nor sexism. Most of the Black subjects reported racial discrimination (70.59%), with a small number of Blacks reporting discrimination due to both gender and race (17.56%). As a follow-up procedure, t-tests indicated that there was a significant racial difference for type of discrimination experienced with Whites ($M = 1.91$, $SD = .29$) experiencing sexism, and Blacks ($M = 3.0$, $SD = .70$) experiencing racism ($t = 8.421$ and $p < .0001$). There were no racial differences for any of the other dimensions of the interview.

Relationship of Interview Ratings to Blood Pressure

Correlational analyses were performed to assess the relationship between interview ratings of potential for hostility, anger suppression, desire to retaliate, hostility directed toward members of the opposite race/gender and the type of discrimination discussed. Hostility felt toward males as a result of gender discrimination was positively correlated with diastolic ($r = .38$, $p < .04$) and mean arterial blood pressure ($r = .46$, $p < .01$) during the interview for White subjects. Many of the White subjects verbally reported hostile generalized statements about

men. None of the other interview dimensions were related to blood pressure for either race.

Cardiovascular Relationships to Personality

Anger Scales. The scores on all personality questionnaires: the Cook and Medley HO Scale, the Anger Expression Scale, the Framingham Anger Scales, the Dean Alienation Scale, Cultural Mistrust Inventory and the Rotter Locus of Control Scale, were compared between racial groups. According to independent groups *t*-tests, there were no significant racial group differences. Several differing aspects of anger expression were assessed by the Cook and Medley HO Scale, the Anger Expression Scale, and the Framingham Anger Scales. Important to the research questions of this study is knowledge of relationships between anger styles and blood pressure during the racist film stimulus and other stressors used in this study. To this end, systolic, diastolic and mean arterial blood pressure during rest and during the racist scene, the video game and the interview were examined as they related to the anger measures. To ascertain whether the relationships of the various forms of anger expression measured in this study to blood pressure were similar for Blacks and White subjects, separate correlations were performed on the nine anger measures for Black and White subjects. Tables 4 and 5 present the significant results from these analyses.

Frequency of controlling anger was assessed by the AXCON subscale of the Anger Expression Scale. Systolic pressure levels during rest and anger were negatively associated with frequency of controlling anger among the White subsample. Therefore, low levels of anger control were associated with higher

Table 4

PEARSON CORRELATIONS AND P-VALUES FOR ANGER VARIABLES AND BLOOD PRESSURE						
WHITE SUBJECTS						
	REST			RACIST SCENE		
	SBP	DBP	MAP	SBP	DBP	MAP
AXEX	0.32	0.38	0.40	0.24	0.14	0.20
	0.06	0.03	0.02	0.16	0.41	0.25
AXOUT	0.34	0.16	0.26	0.36	0.14	0.25
	0.05	0.34	0.13	0.04	0.42	0.14
AXCON	-0.37	-0.04	-0.19	-0.29	-0.03	-0.16
	0.03	0.79	0.26	0.09	0.84	0.36
AXIN	-0.08	-0.04	-0.06	-0.20	-0.21	-0.22
	0.61	0.80	0.69	0.25	0.21	0.20
COOK	0.24	0.17	0.22	0.08	-0.15	-0.05
	0.16	0.32	0.20	0.62	0.37	0.77
FAO	0.23	0.01	0.11	0.21	0.10	0.16
	0.17	0.94	0.51	0.21	0.57	0.35
FAI	-0.07	0.15	0.06	-0.20	-0.11	-0.16
	0.66	0.37	0.70	0.24	0.53	0.35
FAD	-0.00	-0.08	-0.05	0.19	0.13	0.17
	0.98	0.64	0.75	0.27	0.43	0.32
FAS	0.06	0.12	0.11	0.10	-0.07	0.01
	0.72	0.46	0.52	0.55	0.68	0.96

Table 4 (continued)

	INTERVIEW			VIDEO GAME		
	SBP	DBP	MAP	SBP	DBP	MAP
AXEX	0.23	0.17	0.22	-0.00	0.07	0.04
	0.17	0.32	0.20	0.96	0.69	0.78
AXOUT	0.36	0.13	0.24	0.33	0.20	0.28
	0.03	0.46	0.16	0.06	0.24	0.10
AXCON	0.18	0.03	-0.05	-0.20	0.06	-0.02
	0.29	0.85	0.75	0.24	0.71	0.87
AXIN	-0.00	-0.27	-0.19	-0.16	-0.24	-0.24
	0.98	0.11	0.26	0.35	0.16	0.16
COOK	0.09	0.01	0.05	0.02	-0.01	0.00
	0.58	0.93	0.77	0.89	0.95	0.99
FAO	0.24	-0.07	0.05	-0.09	-0.13	-0.13
	0.16	0.69	0.77	0.58	0.45	0.44
FAI	0.18	-0.18	-0.21	-0.27	-0.24	-0.28
	0.28	0.28	0.22	0.11	0.16	0.09
FAD	0.08	0.16	0.15	0.06	0.20	0.17
	0.65	0.34	0.39	0.72	0.24	0.31
FAS	0.09	-0.18	-0.09	-0.27	-0.29	-0.32
	0.59	0.30	0.60	0.11	0.09	0.06

LEGEND:

SBP= Systolic blood pressure.

DBP= Diastolic blood pressure.

MAP= Mean arterial blood pressure.

Note. R values are located in the first row below each variable. P-values are located in the second row below each variable. Significant correlations are in bold faced type. These correlations have 32 degrees of freedom. The P-values shown are 2 tailed values.

Table 5

PEARSON CORRELATIONS AND P-VALUES FOR ANGER VARIABLES AND BLOOD PRESSURE						
BLACK SUBJECTS						
	REST			RACIST SCENE		
	SBP	DBP	MAP	SBP	DBP	MAP
AXEX	0.16	0.13	0.15	0.06	0.10	0.09
	0.35	0.44	0.37	0.72	0.55	0.59
AXOUT	0.05	0.07	0.07	0.00	-0.00	-0.00
	0.77	0.65	0.69	0.99	0.96	0.97
AXCON	-0.06	-0.03	-0.04	-0.06	0.03	0.00
	0.71	0.84	0.78	0.71	0.82	0.99
AXIN	0.39	0.28	0.35	0.25	0.27	0.28
	0.02	0.09	0.04	0.15	0.11	0.09
COOK	-0.17	-0.19	-0.19	-0.13	-0.24	-0.21
	0.32	0.27	0.26	0.45	0.16	0.21
FAO	-0.03	-0.02	-0.00	0.07	0.00	0.03
	0.85	0.87	0.98	0.66	0.98	0.85
FAI	0.01	0.03	0.03	-0.03	-0.03	-0.03
	0.91	0.82	0.85	0.86	0.83	0.83
FAD	-0.37	-0.33	-0.36	-0.20	-0.46	-0.39
	0.02	0.06	0.03	0.23	0.00	0.02
FAS	0.24	0.14	0.19	0.26	0.02	0.12
	0.16	0.40	0.25	0.12	0.88	0.47

Table 5 (continued)

	INTERVIEW			VIDEO GAME		
	SBP	DBP	MAP	SBP	DBP	MAP
AXEX	0.05	-0.02	0.00	0.21	0.21	0.25
	0.74	0.87	0.95	0.22	0.22	0.15
AXOUT	-0.00	-0.08	-0.05	0.14	0.09	0.13
	0.96	0.63	0.75	0.41	0.57	0.44
AXCON	0.02	0.02	0.02	-0.30	-0.19	-0.27
	0.90	0.90	0.90	0.08	0.27	0.11
AXIN	0.22	0.17	0.20	0.47	0.18	0.34
	0.19	0.32	0.23	0.00	0.29	0.05
COOK	-0.23	-0.30	-0.28	0.07	-0.13	-0.07
	0.18	0.08	0.09	0.67	0.44	0.68
FAO	-0.00	-0.03	-0.02	0.09	0.15	0.16
	0.97	0.83	0.88	0.59	0.37	0.36
FAI	0.02	-0.05	-0.02	0.04	-0.16	-0.10
	0.87	0.74	0.90	0.79	0.34	0.54
FAD	-0.42	-0.40	-0.43	-0.30	-0.37	-0.41
	0.01	0.02	0.01	0.08	0.02	0.01
FAS	0.08	0.01	0.04	0.26	-0.16	-0.02
	0.62	0.95	0.79	0.13	0.33	0.91

LEGEND:

SBP= Systolic blood pressure.

DBP= Diastolic blood pressure.

MAP= Mean arterial blood pressure.

Note. R values are located in the first row below each variable. P-values are located in the second row below each variable. Significant correlations are in bold faced type. These correlations have 32 degrees of freedom. The P-values shown are 2 tailed values.

levels of blood pressure. This measure showed no relationship to blood pressure among Blacks.

The frequency of outward expression of anger, was measured by the Anger out subscale. Self-reports of anger out were positively associated with systolic blood pressure during rest, during the racist film stimulus and during the interview, but only for the White subjects. In Blacks, self-reports of anger out were unrelated to blood pressure.

The likelihood of discussing angry feelings was measured by the anger discuss scale of the Framingham Anger Scales. Within the Black subsample, diastolic pressure and mean arterial pressure were negatively associated with Framingham anger discussion for resting levels and for all of the experimental conditions. Framingham anger discussion was more highly correlated to responsivity to racist stimuli than to anger-provoking stimuli. Systolic pressure during the racist scene or video game was not associated with anger discussion; however, resting systolic pressure and systolic pressure during the interview were associated with anger discussion in this subsample.

From these analyses, it appears that higher blood pressure levels are related to failing to discuss angry feelings and to holding anger in (AXIN) among Blacks. For Whites, elevated levels are related to failing to control anger (AXCON) or venting anger outward (AXOUT). For Whites, the only trait measure of anger coping style associated with blood pressure reactivity to the racist scene was anger out. For Blacks anger discussion was most strongly associated to diastolic and mean arterial reactivity to the racist scene out of the three film scenes. These analyses also suggest that the different forms of anger expression vary in their hemodynamic relationship to blood pressure. Some forms of anger expression were related to

systolic pressure, while others were related to diastolic pressure. For Blacks, not being likely to discuss anger was more related to diastolic and mean arterial pressure than systolic pressure. For Whites, reported frequency of controlling one's anger and expressing anger outwardly was more related to systolic pressure.

Cynical hostility was assessed by the Cook and Medley HO Scale. It was thought that trait levels of cynical hostility would be positively associated with blood pressure. However, there was no linear relationship between hostility and blood pressure for either racial group. Sallis, Johnson, Trevorrow, Kaplan and Hovell (1987) also found no relationship between hostility and blood pressure reactivity, but suggested that, "...there may be a restricted range in the hostility or reactivity measures that would obscure a relationship" After plotting the hostility scores by blood pressure, graphic representation indicated that there indeed appeared to be a threshold level of hostility where blood pressure and hostility were related. Thus, both racial groups were divided into low and high hostility groups according to their median. Those subjects who scored at or above the median composed the high hostility group; those who scored lower than the median composed the low hostility group. Low levels of hostility were uncorrelated to blood pressure for each racial group and high levels of hostility, were also uncorrelated to blood pressure for Blacks. One set of significant findings arose from these analyses. For White highly hostile women, both resting systolic ($r = .60$, $p < .02$) and mean arterial blood pressures ($r = .52$, $p < .04$) and systolic blood pressure during the interview ($r = .52$, $p < .04$) were highly associated with high levels of hostility.

Alienation: Powerlessness, Normlessness and Isolation. Feelings of alienation from mainstream society were assessed by the three Dean Alienation subscales: isolation, powerlessness and normlessness. Central to the research questions

proposed in this study is whether blood pressure during the racist scene is associated with feelings powerlessness in society. Pearson correlations with the Dean Alienation subscales and blood pressure after the racist scene were conducted independently for Blacks and Whites. For White subjects, there were no relationships between societal powerlessness, normlessness, isolation or total alienation and blood pressure. One Black subject was excluded from these analyses for failure to correctly complete the Dean Alienation scales. For Black subjects, it was found that there was no relationship between blood pressure, normlessness and powerlessness. Isolation from friends and relatives, however played a role in blood pressure reactivity for Blacks. It was found that for Blacks, increased feelings of social isolation were associated with lower systolic and mean arterial pressure during rest. During the racist scene, diastolic and mean arterial blood pressure were also inversely related to expressed feelings of isolation such that the greater isolation was associated with lower blood pressure levels. Similarly, during the interview, decreased diastolic and mean arterial pressures were associated with increased feelings of societal isolation. Total alienation, which is the sum of the powerlessness, normlessness and isolation subscales, was related to diastolic pressure during the interview ($r = -.37, p < .04$). Table 6 provides the Pearson correlations for these relationships.

The more social isolation that Black subjects felt, the lower their blood pressures were during rest and the experimental conditions. Diastolic blood pressure during the racist scene and the interview demonstrated the largest relationships. Given that anger discussion is also associated with lower measures of blood pressure, a conceptual problem unfolds. The anger discussion items of the Framingham questionnaire indicate that a subject discusses her anger with friends

or relatives and the isolation subscale clearly addresses feelings of isolation caused by not being around friends or relatives. Both anger discussion and feelings of isolation were inversely associated with blood pressure for Blacks. The intercorrelation between these two variables was ($r = .44$, $p < .01$).

Mistrust of Whites. Mistrust of Whites by Blacks was measured by the Cultural Mistrust Inventory. The inventory consists of four subscales measuring cynical mistrust of Whites in business, politics, education and interpersonal relationships. It was originally thought that there would be a direct, positive relationship between blood pressure during the racist scene and degree of cultural mistrust as measured by the four subscales. No relationship was found between any of the mistrust measures and blood pressure. The cultural mistrust measures were related to several of the other measures that were related to blood pressure. It was also found that isolation was strongly related to mistrust of Whites in education and training settings ($r = .61$, $p < .00$). Isolation was also moderately related to mistrust of Whites in interpersonal relationships ($r = .38$, $p < .03$).

Table 6

PEARSON CORRELATIONS AND P-VALUES FOR ALIENATION VARIABLES AND BLOOD PRESSURE						
BLACK SUBJECTS						
	REST			RACIST SCENE		
	SBP	DBP	MAP	SBP	DBP	MAP
ISOLATION						
	-0.36	-0.31	-0.35	-0.21	-0.42	-0.37
	0.04	0.08	0.06	0.24	0.03	0.05
POWERLESSNESS						
	0.02	-0.08	-0.03	0.06	-0.17	-0.08
	0.90	0.64	0.82	0.70	0.34	0.62
NORMLESSNESS						
	-0.03	-0.13	-0.09	-0.04	-0.21	-0.16
	0.86	0.45	0.59	0.80	0.23	0.36
ALIENATION						
	-0.16	-0.24	-0.22	-0.06	-0.37	-0.28
	0.35	0.17	0.21	0.70	0.04	0.12
	INTERVIEW			VIDEO GAME		
	SBP	DBP	MAP	SBP	DBP	MAP
ISOLATION						
	-0.25	-0.44	-0.39	-0.17	-0.16	-0.20
	0.15	0.01	0.03	0.32	0.36	0.26
POWERLESSNESS						
	0.10	-0.04	0.01	-0.09	-0.20	-0.20
	0.58	0.79	0.91	0.61	0.24	0.27
NORMLESSNESS						
	-0.06	-0.19	-0.14	-0.00	-0.12	-0.09
	0.73	0.29	0.44	0.97	0.50	0.59
ALIENATION						
	-0.07	-0.29	-0.20	-0.15	-0.25	-0.25
	0.67	0.09	0.25	0.40	0.16	0.15

Correlations for Black subjects have 30 degrees of freedom.

Table 6 (continued)

WHITE SUBJECTS						
	REST			RACIST SCENE		
	SBP	DBP	MAP	SBP	DBP	MAP
ISOLATION						
	0.09	0.05	0.07	-0.01	-0.02	-0.02
	0.58	0.78	0.66	0.95	0.88	0.90
POWERLESSNESS						
	0.14	0.26	0.23	0.22	0.17	0.21
	0.43	0.14	0.18	0.21	0.32	0.23
NORMLESSNESS						
	0.04	-0.00	0.01	0.17	0.02	0.09
	0.80	0.98	0.91	0.33	0.88	0.58
ALIENATION						
	0.15	0.23	0.22	0.23	0.15	0.20
	0.37	0.18	0.20	0.18	0.40	0.26
	INTERVIEW			VIDEO GAME		
	SBP	DBP	MAP	SBP	DBP	MAP
ISOLATION						
	0.03	-0.09	-0.06	0.17	0.11	0.15
	0.88	0.60	0.76	0.35	0.52	0.40
POWERLESSNESS						
	0.12	0.23	0.21	-0.07	0.27	0.17
	0.48	0.19	0.22	0.67	0.12	0.33
NORMLESSNESS						
	0.06	0.03	0.05	-0.06	-0.14	-0.13
	0.72	0.85	0.78	0.70	0.42	0.45
ALIENATION						
	0.17	0.18	0.18	0.03	0.22	0.15
	0.35	0.31	0.30	0.83	0.21	0.40

Correlations for White subjects have 31 degrees of freedom.

LEGEND:

SBP= Systolic blood pressure.

DBP= Diastolic blood pressure.

MAP= Mean arterial blood pressure.

Note. R values are located in the first row below each variable. P-values are located in the second row below each variable. Significant correlations are in bold faced type. The P-values shown are 2 tailed values.

Cardiovascular responses: relation to control. In this study controllability of reinforcement in one's life and the desire/motivation to obtain and maintain power and control were thought to be related to blood pressure and coping with racism. It was found that external locus of control, as measured by Rotter's Locus of Control Scale was not significantly related to blood pressure for Blacks or Whites. Desire of control as measured by The Desirability of Control Scale was negatively related to systolic pressure during the racist scene for Whites ($r = -.38, p < .04$), but not for Blacks. White subjects who desired to obtain and maintain control over their environments had lower blood pressure during the racist scene. Even though Blacks and Whites had similar desire for control scores, blood pressure was only related to desire of control among White subjects.

CHAPTER 8

DISCUSSION

This study was significant in that it investigated the psychosocial, affective, and cardiovascular parameters of racial stress among Black women. Black women have not been thoroughly studied concerning the cardiovascular effects of racism as a stressor, nor have they been thoroughly studied concerning cardiovascular measures, and their relationship to psychological measures, such as feelings of powerlessness and anger expression. Additionally, few studies have investigated the typology of racial stressors occurring in the everyday lives of Black women through interviews.

It was the purpose of this study to extend the understanding of the physiological and psychological correlates of the experience of racism in Black women and to explore racial differences in responsivity and affective coping to racial stressors. The research compared the cardiovascular effects of racial stressors to other anger- provoking and neutral stressors among Black and White females. Additionally, this study investigated the magnitude of physiological responses to an interpersonal stressor (discrimination interview) and a traditional stressor (video game challenge). Exploratory analyses were performed to answer research questions not previously defined in the literature. The present study also attempted to delineate possible racial differences in relationships between affective responses to racism, personality characteristics and physiological responsivity.

One of the strengths of this study was the demographic similarity obtained between the Black and White subgroups. Studies often compare

individuals across racial groupings without properly controlling for socioeconomic and demographic differences (Tyroler and James, 1978). Black samples are often represented by a lower socioeconomic status than Whites. Subsequently, psychosocial and physiological measures may interact differently between levels of socioeconomic stratification and race. In the present study, Blacks and Whites were similar across all the demographic and health variables (i.e. marital status, occupation, income, number of children, education level, age, height, weight, personal health, incidence of smoking and exercising regularly).

The incidence of positive family history of hypertension did not differ between the races. For Black subjects however, positive family history of high blood pressure was associated with higher levels of diastolic and mean arterial blood pressure than Black individuals with negative family histories. It would appear that for Blacks, resting blood pressure levels were not influenced by family history and that family history makes its most pronounced impact upon levels of blood pressure during active coping tasks, such as video game challenge. This would suggest that perhaps this type of active coping task elicits a pressor response that may be carried by a heritable response predisposition.

One of the primary research goals of this study was to investigate the physiological correlates of exposure to racist stressors in Black and White females. Given the background literature and aims of this study, several sets of analyses were performed to test the following primary experimental concerns of this study:

- 1. Does exposure to racist stimuli increase systolic, diastolic and mean arterial blood pressure levels above resting blood pressure levels and blood pressure levels during exposure to anger-provoking and neutral film stimuli?**
- 2. Should differences occur between resting blood pressure and blood pressure after the racist film stimuli, do concomitant differences occur between rest and the three film stimuli for heart rate, total peripheral resistance and stroke volume?**
- 3. Are there racial differences in the pattern of responsivity to the three film stimuli?**

The results of this study provide strong support for the hypothesis that exposure to racist stimuli increases systolic, diastolic and mean arterial pressure above resting blood pressure levels and blood pressure during the neutral film scene. The blood pressure results obtained replicated an earlier study performed by Armstead et al., (1989) using an all Black sample. The aforementioned experimental questions have not been previously tested in a White sample. An unhypothesized assumption was put forth. It was thought that viewing the film scenes would be a passive coping task associated hemodynamic responses indicating alpha-adrenergic responsivity. Inclusion of the neutral film scene provided a comparison measure for the effects of simply viewing television. This scene failed to produce blood pressure increases above resting levels. Thus, we can safely assume that it was the content of the other two stimuli that raised blood pressure and not the sensory act of viewing television.

It was found that racism raised blood pressure significantly over resting levels among Blacks, as well as Whites. Comparisons were made to assess the difference between a racist film stressor and a non-racial film stressor with emotional content. It was found that systolic, diastolic and mean arterial pressure measures during the racist scene were significantly

higher than during the anger-provoking scene for Blacks, but not for Whites. Systolic and mean arterial pressure among Whites during the racist scene and the anger-provoking scene were equivalent. Whites failed to show a diastolic pressor response to any of the stimuli; therefore, the anger and racist scenes were not significantly different from rest. This would seem to indicate that in passive coping situations, Whites do not have a particular propensity toward pressor responsivity. They appear to be systolic responders. Blacks however, showed a strong pressor response. Pressor responses are considered to be indicative of alpha-adrenergic arousal (Anderson, et al., 1988). It would appear that for Blacks, viewing racist stimuli was associated with increased sympathetic activation over and above that which is elicited by viewing mere anger provocation. This activation appears to have a alpha-adrenergic, pressor component. No difference was found among Whites for diastolic pressure during any of the three film scenes and rest.

Blacks and Whites differed in the hemodynamic mechanisms underlying the qualitative blood pressure responses to racist stimuli. The systolic, mean arterial and diastolic pressor responses among Blacks were primarily associated with a concomitant rise in total peripheral resistance, suggesting pure alpha-adrenergic activity. Among Blacks, none of the other hemodynamic variables deviated from levels encountered during baseline. See figure 8.

Among Whites, the systolic and mean arterial responses may have been produced by a rise in total peripheral resistance, a decrease in stroke volume from baseline and a decrease in cardiac output suggesting a coupling

of alpha-adrenergic responsivity (changes in total peripheral resistance) and beta-adrenergic responsivity (changes in cardiac output). During the racist film stimulus, Whites tended to respond with a slight inhibition of beta-adrenergic dominant responses as indicated by decreases in cardiac output. See figure 9.

This response pattern among Whites is categorized as a mixed hemodynamic pattern in which alpha and beta mechanisms were linked to each other in a reciprocating fashion; whereas, for Blacks, changes in total peripheral resistance were not accompanied by changes in cardiac output. Thus, we have the vascular system playing an important role in blood pressure regulation among Blacks without a dominant influence of the heart. This pattern deviates from the pattern found in many normotensives (Julius 1985).

These findings would suggest that the hemodynamic mechanisms underlying the blood pressure changes point to a normal relationship of autonomic control between the heart and vascular system among Whites, but not among Blacks. It should be remembered that the often discussed, long term effects of vasoconstriction due to passive coping may differ from the immediate effects. We are discussing pre-autoregulatory processes in this laboratory situation (Miller and Ditto, 1989).

The immediate effects of passive coping among Whites appeared to be increased vasoconstriction and a concomitant slight decrease in cardiac output. In one of the often used medical texts it says that increases in total peripheral resistance are accompanied by increases in cardiac output (Guyton, 1981). This text is not discussing the acute relationship between

cardiac output and total peripheral resistance found in laboratory stress conditions of less than ten minutes. In our study, when vasoconstriction occurred due to sympathetic stimulation in a passive coping environment, total peripheral resistance may have increased in the vasculature and less blood may have reached the heart per minute (Milnor, 1982) causing cardiac output to temporarily drop. Tissue perfusion may have been compromised, therefore a compensatory vasodilation with an increase in venous return may have come into play.

According to Guyton (1982), the Frank-Starling Law of the heart has at its basis the notion that the heart plays a permissive role in the regulation of cardiac output. The primary factor that determines how much blood will be pumped into the heart is the amount of venous return from body tissues not the pumping load of the heart. Stated another way, tissues control cardiac output in accordance to their metabolic needs and the heart plays a permissive role allowing any amount of blood that is needed to be pumped up to a maximum of 13-15 liters per minute. The long term effects of these processes would be an increase in cardiac output via the Frank-Starling mechanism due to an increase in total peripheral resistance. Increased cardiac output would subsequently increase resistance due to vascular blood flow increase and therefore total peripheral resistance would increase. Through such initiation of long term autoregulatory mechanisms, which take at least one half hour (DeGood, 1975), increases in cardiac output are ultimately accompanied by increases in total peripheral resistance. Whites appeared to demonstrate a reciprocal coupling of cardiac and vascular responses that is "pre-autoregulatory" in nature.

Blacks showed greater vasoconstriction as indicated by their greater overall total peripheral resistance and seemingly an inhibition of cardiac effects (Cardiac output, heart rate and stroke volume were unresponsive to the racist film scene). These relationships are indicative of a decoupling of alpha-adrenergic responsivity and beta-adrenergic responsivity. Black individuals may be more predisposed toward a more pronounced alpha-adrenergic responsivity with no concurrent pattern of cardiac linkage. They respond to passive coping situations with vasoconstriction, yet it appears that this lowered venous return due to the vasoconstriction does not provide sufficient cardiac feedback.

It has been hypothesized that blood pressure among many normotensive Blacks is maintained to a greater degree by total peripheral resistance than by cardiac output (Anderson, et al., 1988; Morrell et al., 1990). Additionally it is believed that Blacks often resemble the pattern of low cardiac output and high peripheral resistance found in established hypertensives without ever having gone through a borderline stage of increased cardiac output and normal total peripheral resistance (Julius and Esler, 1985; Schneiderman, personal communication May 17, 1990; Bassitt, 1991).

The nature of the task was found to play an important determining role in whether alpha-adrenergic or beta-adrenergic responses were elicited by a particular task. Active coping tasks tend to be associated with beta-adrenergic responsivity, while passive coping tasks tended to be associated with alpha-adrenergic responsivity. McKinney et al. (1984) state, "Sensory tasks elicit a beta-adrenergic response with elevated cardiac output. Mental

concentration tasks elicit an alpha-adrenergic response with increased total peripheral resistance.". Obrist et al. (1978) found that amount of perceived control also played a role in whether an individual responded with alpha or beta-adrenergic activation. They write,

Where beta-adrenergic effects were maximal, systolic blood pressure was more appreciably elevated while diastolic blood pressure was less elevated than when beta-adrenergic effects were minimal....Beta-adrenergic influences were either minimal or rapidly dissipated under conditions where no control was possible, i.e. the cold pressor, a pornographic film, inescapable shocks or conditions which provided ready mastery of the task (pp 102-115).

It is thought that although watching films scenes is a passive task that requires no behavioral response, subjects are asked to imagine themselves as the main character. Imagery may produce an active coping response. This imagery manipulation was included in the task instructions to make the viewing of the stimuli less sensory in nature and less vicarious. It was thought that White subjects may have needed to engage in more of active imagery to identify with the main character than would Blacks, who probably had little trouble identifying with this scene. It was also difficult to determine how much imagery actually occurred in proportion to the sensory act of viewing the film stimuli.

Emotionality and perceptions of control are thought to play a large role in determining the whether a response is alpha- or beta-adrenergic in nature. Rosenman (1985) writes,

Many emotions induce cardiovascular differences reside in the mix of alpha- and beta-adrenergic secretions. It is primarily the perception of an event that determines the emotional response and hence the psychophysiological consequences. Anger is a cognitive response that is associated with personal appraisal and interpretation and induces an active coping response in the susceptible individual. The finding that offspring of hypertensive parents who are at increased risk for sustained hypertension, also exhibit higher baseline systolic blood pressure and higher heart rate responses may not be a paradox, considering that the special role of anger for hypertension resides in the unique pressor response to unexpressed anger. This response may even play a role in the resetting of baroreceptors, which in itself is relevant for hypertension (p. 105).

State anger was assessed in this study by a mood checklist. All participants reported moods other than anger after viewing neutral stimuli. Many respondents felt bored or happy during the neutral scene. There were no racial differences in the ratings of these emotions for the neutral scene. Participants of both races reported feeling more angry after viewing racist stimuli than after viewing anger-provoking stimuli.

For White subjects, mood ratings were not associated with systolic, diastolic or mean arterial blood pressure measures during the racist scene. For Blacks, increased self-reports of anger were associated with lower systolic, diastolic and mean arterial blood pressures. Fear was also inversely associated with systolic, diastolic and mean arterial pressure. It would appear from these analyses that emotional states were more intimately tied to blood pressure among Blacks than among Whites, although both Blacks and Whites both showed responsivity to the racist stressor. The experience of watching the racist scene may have been more vicarious and mood ratings may have been based primarily on sympathy and social desirability among Whites. For Blacks, ratings of the racist scene may

have been tied to a combination of latent anger, empathy and fear of the effects of racism.

Among Blacks, anger was related to a general systolic, diastolic and mean arterial activation. It appears the opportunity to acknowledge and report negative emotional states on the mood checklist was associated with lowered responsivity to noxious film stimuli. An alternate, more plausible, hypothesis may be that Black individuals who are able to acknowledge state anger may have lower blood pressure because they are not habitually experiencing the catecholaminergic consequences of suppressed anger. It should be remembered individuals demonstrating the so-called "hypertensive personality" are thought to deny and/or suppress anger. Blacks who tend to deny/and or suppress anger in this study may have had higher pressures during the racist scene. In support of this ascertain are the results of the analyses concerning anger suppression (AXIN) and blood pressure. There was a modest positive relationship between systolic and mean arterial pressure during the racist scene and anger suppression as measured using the AX Scale anger-in subscale among Blacks. There was no way to discern anger denial using the pen and pencil measures available in this study.

As a traditional cognitive stressor, video game challenge was found to induce significant increases in systolic, diastolic and mean arterial blood pressure levels among both Blacks and Whites. There was a racial difference in overall total peripheral resistance, with Whites demonstrating more vasoconstriction than Blacks. Although overall cardiac output was not different between Blacks and Whites, video game challenge elicited a

modest significant increase in cardiac output among Blacks that did not occur among Whites. For both Black and White subjects, heart rate increased during the video game from resting levels. Stroke volume did not change. From these findings, it can be concluded that Blacks responded to the video game challenge, which is a stressor requiring active coping with a minimal amount of sympathetic activation of the heart and a greater involvement of the vascular system. Total peripheral resistance still appears to be more important in maintaining the blood pressure response than cardiac output or heart rate. It can be said that Blacks tended to make a mixed response to this active coping situation similar to the reaction described by Schneiderman (1985). These responses are probably represented by more beta activity than was found during the racist scene, yet alpha adrenergic responses were highly important. Graphic representations support this notion. From figure 4 it is obvious that total peripheral resistance was greater during the racist stimulus than during the video game challenge among Blacks. In figure 5 we can see that cardiac output during the video game is indeed greater than during the racist stimulus. Figure 7 depicts the rise in heart rate that occurred. It is easily seen that the video game was associated with the greatest rise in heart rate. Obrist et al., 1978 found that, "Beta-adrenergic effects were more pronounced under conditions in which the subjects were either led to believe they had control or where some control was actually provided i.e. a shock avoidance task." Although perceived control was not assessed for the video game task, it is possible that Black subjects actually believed they had control over the outcome of the video game; whereas, they may have believed that they have

less control over the effects of racism. Whites also showed a mixed beta/alpha-adrenergic response to the video game stressor as demonstrated by increases in heart rate and total peripheral resistance.

It also appears that among White subjects, the mixed response was more alpha-dominant during the racist film scene than during the video game challenge. A casual unquantified observation may have importance in explaining this alpha dominance among White subjects during the video game stressor. Many of the White subjects commented that they could not play Nintendo well or were unfamiliar with the game and were frustrated and extremely concerned about doing poorly. Many of the Black subjects had played Nintendo before their arrival to the laboratory and appeared to feel confident in their skill. Of course, there were many other Blacks that had never played Nintendo. As a group, Black subjects did not tend to express a great deal of concern about competing or doing poorly compared to White subjects and tended to ignore the challenge contained in the task instructions (to achieve a better score than the other subjects). Perhaps, Whites who felt they could not compete with the rest of the subjects, responded passively to the video game and Blacks engaged in active coping due to their perceptions of control. Perhaps Whites had less perceived control over the task and displayed more affective reactivity in the form of frustration which produced alpha-adrenergic effects.

One of the other major research goals of this study was to assess the physiological effects of an interpersonal stressor (discussion of discrimination). Discussion of personal discrimination was thought to be an interpersonal stressor, as well as a catalyst for affective responding. From

the results of this study, it was found that discussion of personal discrimination increases systolic, diastolic and mean arterial blood pressure from resting levels. These effects are racially divergent only for mean arterial and diastolic pressures. Thus for diastolic and mean arterial pressure, Blacks had higher overall pressure levels during rest and the task. For systolic pressure, the response was racially comparable among Blacks and Whites. The dissimilarity between the two races in relation to the pressor and mean arterial responses may lie in a differing hemodynamic pattern of responsivity. Among Whites, there was a non-significant increase in total peripheral resistance, suggesting that alpha-adrenergic systems were weakly involved. Graphically, it can be seen that cardiac output and heart rate increased, while stroke volume decreased. See figures 4-7. This hemodynamic response pattern points to a reciprocal relationship between alpha-adrenergic and beta-adrenergic systems among Whites. Blacks displayed a large alpha-adrenergic response to the interview. Total peripheral resistance increased, well above baseline and the other stimuli and heart rate increased slightly. Blacks demonstrated a vascular dominance which was decoupled from cardiac influence. This is similar to what occurred during the racist stressor.

It should be noted that during the personal discrimination interview, none of the White subjects reported being discriminated against because of race, yet almost all of the Black subjects reported experiencing racism alone or in conjunction with sexism. Anger suppression, generalized hostility directed toward members of the opposite race or sex due to discrimination, potential for hostility and vocal loudness were rated in addition to type of

discrimination. It was thought that the anger content of the personal discrimination interview might be linked to blood pressure responsivity to the interview. There was only one significant relationship between blood pressure and the items assessed in the interview. Hostility felt toward males as a result of gender discrimination was positively correlated with diastolic and mean arterial blood pressure during the interview for White subjects. Many of the White subjects verbally reported hostile generalized statements about men. It may be that hostility directed toward men is the only socially acceptable form of hostility that women feel they can express. Hostility toward Whites is not socially appropriate, therefore Blacks must deny and suppress hostility toward Whites due to racism. Perhaps when White women discussed the hostility that they felt toward males, they were more emotionally authentic than Blacks discussing racial discrimination and discharged this sympathetic arousal during the interview. Maybe Blacks carry around these feelings in a suppressed form which contributes to elevated resting levels of blood pressure, but not responsivity to the stressor. These findings would indicate that hostility during the discussion of sexist experiences may be associated with heightened blood pressure levels among White women. It would appear that the factor influencing blood pressure among White women who have been discriminated against due to their gender is the chronic feelings of hostility that they may retain after the incident.

Some Black participants appeared reticent to discuss their feelings concerning personal racism when White assistants were in the laboratory, although the actual interviewer was always Black. It should be noted that

these women are employees of the university and may have felt that the audio-taped discussion of such sensitive issues may jeopardize their employment. Often after the interview was concluded and the tape player turned off, subjects would appear to open up and discuss their feelings freely. There was also difficulty in the scoring of some of the interviews. It was difficult to hear more subtle vocal inflections due to the poor quality of the tape recordings. Non-verbal behavior was missed because the interviews were not videotaped. Nonverbal behavior is often just as telling as verbal behavior, especially when emotion is being suppressed (Coleman, personal communication; March, 19, 1991).

This study has the transactionalist orientation as its philosophical underpinning. The transactionalist orientation proposes that diseases processes are a function of biological predispositions, historical, social and environmental influences, cognitive perceptions, and affective displays and behavior (Feurerstein, Labbe and Kuczmierczy, 1986). With this in mind, we attempted to relate cognitions and affective traits to our biological data in explaining responsivity to the racist stressor. It was found that many of the elements proposed by Triandis et al. (1975) in his treatise concerning Black perceptions of the social environment shared communality with many of the personality and affective factors thought to be relevant to the development and maintenance of hypertension among Black Americans. For the purposes of this research, ecosystem distrust was thought to subsume the behavioral, cognitive and affective outcomes of existence in a racist milieu. With this in mind, one of the other goals of this study was to assess the relationships between variables associated with both ecosystem distrust

and hypertension: anger expression, powerlessness, hostility and racial mistrust and the physiological response, to racism.

In this study controllability of reinforcement in one's life and the desire/motivation to obtain and maintain power and control were thought to be related to blood pressure and coping with racism. It was found that external locus of control, as measured by Rotter's Locus of Control Scale was not significantly related to blood pressure for neither Blacks nor Whites and that their scores were well within the norm found by Rotter (1966). Rotter's standardized norm was 10.5. Our mean was 9.5. This finding conflicts with much of the previous research (Houston, 1972; Manuck, Craft, and Gold, 1978; DeGood, 1975).

Most of this earlier research was performed using White, male samples. Because neither race showed an association between locus of control and blood pressure, perhaps the explanation lies with the gender of our sample. Among women, this lack of relationship between locus of control as a trait and blood pressure during the racist stimulus may be better explained by understanding the subject's perception of situational control during the stimulus (cognitive state). This perception of control may either be related to the task characteristics or may be associated with what was actually happening to the main character during the scene. Perhaps trait perceptions of control that have no situational relevancy do not possess a relationship to blood pressure responsivity. As discussed in the section concerning the video game, a redesign of this study would include a short checklist measuring perceived situational control.

Feelings of societal powerlessness or lack of environmental control were thought to be correlates of ecosystem distrust and were thought to relate to blood pressure positively. It was found that there was no relationship between feelings of societal powerlessness and blood pressure among Blacks or Whites. Thus, it can be concluded that lack of power, locus of control and desire of control measures are unrelated to blood pressure during the racist scene among Blacks. As indicated by the relationship of Desire of Control scores to blood pressure, it was found that White subjects who did not desire to obtain and maintain control over their environments had somewhat higher systolic blood pressure during the racist scene than Whites who desired to control their environments. Items on this scale are exemplified by: 1) I enjoy having control over my own destiny, 2) I prefer a job where I have a lot of control over what I do and when I do it, 3) I consider myself to be generally more capable of handling situations than other are. These items may be related to the need for power as described by McClelland (1979).

McClelland (1979) found that men with inhibited power motive had higher blood pressures than men with lower blood pressure than men without inhibited power motive. Inhibited power motive was also found to be related to development of hypertension in a prospective study performed by McClelland (1979b).

If a diastolic pressure of ninety millimeters of mercury is considered indicative of clinically significant hypertension, 61 percent of men who had inhibited power syndrome in their early twenties showed signs of hypertension in their early thirties, as contrasted as only 23 percent of the men in the other motive classifications ($p < .01$) (p.. 321).

Inhibited power motive appears to be conceptually akin to powerlessness and the opposite of high desire of control (McClelland, 1979). Inhibited power motive is derived by rating the need for power content and activity inhibition (the number of times the word **not** appears in the TAT stories) of thematic apperception test content. Blumenthal et al. write, "..... It has been suggested that the mechanism by which the inhibited power motive may be responsible for hypertension is the chronic activation of the sympathetic nervous system. Consequently, we expected individuals displaying this pattern to exhibit enhanced cardiovascular reactivity." Blumenthal, Lane, and Williams (1985) found that inhibited power motive was not related to reactivity to stressors among men. Our findings, however, add support to the inhibited power motive/ reactivity relationship. White women with lower desire of control scores can be thought of as having a higher degree of inhibited power motive. These women displayed a tendency toward higher blood pressures during the racist scene. Even though Blacks and Whites had similar scores, blood pressure was only related to desire of control for White subjects. Thus from these findings it can be concluded that trait measures having to do with control and power are not related to blood pressure among Blacks.

Anger-coping style, as an affective trait, was proposed in this study as the primary affective variable underlying hemodynamic responsivity by individuals coping with racism. Racial differences were also examined. Our results suggest that different forms of anger expression vary in their hemodynamic relationship to blood pressure and race. Some forms of anger expression were related to systolic pressure, while others were related to

diastolic pressure. Measures that were related to blood pressure among Blacks tended to be related to diastolic pressure, while anger measures were generally related to systolic pressure among Whites. Anger was associated with alpha-adrenergic type pressor responses among Blacks and beta-adrenergic type systolic responses among Whites. The following will be a discussion of anger coping for each race.

Among Whites anger measures were correlated almost exclusively with resting blood pressure levels or blood pressure during the interview. For White highly hostile women, both resting blood pressure and blood pressure during the interview were highly associated with level of hostility. For White women, there appeared to be a hostility threshold (as measured by the Cook Medley Scale) where blood pressure becomes correlated with high levels of hostility. Moderate levels of hostility appear to have had no more influence on blood pressure than did low levels of hostility during rest and the interview. Hostility scores of 14 and above have been found to be related to a higher incidence of coronary heart disease (Barefoot, et al. 1983). High levels of hostility, as measured by the HO Scale, were associated with increased responsivity to a high interpersonal conflict laboratory stressor, as compared to a low conflict stressor (Hardy and Smith, 1988). Blood pressure responses brought about by stressors lacking an interpersonal conflict component were not associated with increased hostility on this scale (Smith and Houston, 1987).

Additionally, during the interview it was found that among White women, verbalizations of generalized hostility toward men due to sexism were correlated with systolic pressure during interview. Interview self

reports and this pen and pencil measure of hostility appear to add convergent validity to this study. Whites who expressed more feelings of alienation also had higher hostility scores ($r = .59$, $P < .001$). Houston, Smith, and Cates (1989) performed a hierarchical cluster analysis to discern groups of individuals differing in their responses to the Cook Medley HO Scale, the Framingham Anger Scales and the Inventory of Social Supportive Behaviors. It was found that, "Exaggerated reactivity in systolic blood pressure to the two experimental tasks was exhibited by subjects in a subgroup who appear to have negative feelings toward people, but disavow these feelings and inhibit aggression so as not to alienate others. However, these individuals may have difficulty concealing their view of others and controlling their anger which, in turn, may erode their social support."

Eroded social support may create the feelings of alienation correlated with hostility in our study. Several measures indicating a likeliness to express and direct anger outward were also correlated with blood pressure and hostility among Whites. As a result of the preceding discussion, several post-hoc analyses were performed. It was found that scores above the median for Cook-Medley hostility were related to frequency of anger out ($r = .62$, $p < .01$) to frequency of anger control ($r = -.74$, $p < .001$), and to frequency of total anger expression ($r = .83$, $p < .0001$). Frequency of controlling anger was assessed by the AXCON subscale of the Anger Expression Scale. Systolic pressure levels during rest and anger were negatively associated with frequency of controlling anger. Therefore, low levels of anger control were associated with higher levels of blood pressure. This measure showed no relationship to blood pressure among Blacks. The

frequency of outward expression of anger, was measured by the AXOUT subscale. Self-reports of anger out were positively associated with systolic blood pressure during rest, during the anger-provoking film stimulus and during the interview, but only for the White subjects. Our data subsequently appear to be very much like the subgroup of systolic reactors found in the Houston, et al. (1989) study. They write, "These individuals may exhibit greater physiological reactivity because they experience greater aggressive feelings, which they also effortfully try to inhibit" (Houston, et al., 1989).

Anger suppression and failure to discuss anger with friends and relatives were the only variables related to blood pressures among Blacks. It appears that higher blood pressure levels are related to failing to discuss angry feelings and to holding anger in (AXIN) among Blacks. This replicates a previous study in which lower anger discussion scores were associated with higher blood pressures after racist stimuli (Armstead et al., 1990). Blacks may have been likely to use intrapsychic coping traits linked with anger-discussion in affective responses to the racist film scene and discussion of personal discrimination (racism). Mean arterial pressures during the interview was also similarly correlated to likelihood of anger discussion such that people who were less likely to discuss their feelings of anger had higher blood pressures during the interview in which they discussed personal discrimination. Since racism is a social construct, it would follow that an increased likelihood of discussing of racism with friends and relatives would be an adaptive coping mechanism. Discussion of angry feelings brought about racism may be cathartic, thus individuals using this coping mechanism may not seethe with hostility toward Whites. It may also

be that people who do not discuss their anger habitually, may have been aroused sympathetically by having to do so during the interview. This situation may have been much more stressful to these subjects than to others who tend to discuss their emotions.

Also, it is thought that the long term catecholaminergic arousal brought about by chronic hostility, failure to discuss one's feelings and anger suppression may be the main affective elements producing pathogenic effects. Anger suppression was most highly correlated to resting systolic and mean arterial pressures. Considering responsivity to the video game task among Blacks was produced by a mixture of alpha/beta-adrenergic responses, the high correlation between anger suppression and systolic blood pressure may be indicative of a cardiac activation that appears in individuals who are likely to suppress their anger during active coping. This may only hold true for active coping tasks or instances in which there are no interpersonal or social elements. Diastolic and mean arterial pressures during tasks that have social content (the racist film scene and the interview) were correlated with anger discussion and can be thought of as partial functions of frequency with which anger is discussed in a social context. Thus, anger associated social connotations among Blacks was related to pressor and alpha-adrenergic responsivity in this study. If failure to discuss anger among friends and relatives is viewed as a form of anger suppression, Blacks in this study appeared to have displayed the typical anger suppression personality pattern of hypertensives and concomitant alpha-adrenergic arousal in a passive coping situation containing social elements. Whites tended to display more of hostility in relation to resting blood pressure.

Feelings of alienation from society were assessed by the three Dean Alienation subscales: isolation, powerlessness and normlessness. Central to the research questions proposed in this study is whether blood pressure during the racist scene is associated with feelings powerlessness in society. For White subjects, there were no relationships between societal powerlessness, normlessness, isolation or total alienation and blood pressure. For Black subjects, it was found that there was no relationship between blood pressure, normlessness and powerlessness. Desire of control and power are thought of as Eurocentric traits based in oppression among Africentric theorists (Baldwin, 1980). Blacks in this study demonstrated no physiological arousal associated with these dimensions.

Isolation from friends and relatives, however played an important role in blood pressure responsivity for Blacks. It was found that for Blacks, increased feelings of social isolation were associated with lower systolic and mean arterial pressure during rest. During the racist scene, diastolic and mean arterial blood pressure were also inversely related to expressed feelings of isolation in such a manner that less isolation was associated with higher blood pressure levels. Similarly, during the interview, decreased diastolic and mean arterial pressures were associated with increased feelings of societal isolation. Total alienation, which is the sum of the powerlessness, normlessness and isolation subscales, was related to diastolic pressure during the interview. The more social isolation that Black subjects felt, the lower their blood pressures were during rest and the experimental conditions. Diastolic blood pressure during the racist scene and the interview demonstrated the largest relationships. Why would isolation be

associated with lower blood pressure during the racist scene and during the discussion of racism?

Intuitively, one would reason that if isolation is associated with lower blood pressure, one must be either isolating one's self from noxious social contact, not merely friends or relatives. Majority contact may be associated with an increased incidence of racism which is definitely noxious social contact. Perhaps, feeling isolated from majority contact made racism seem less salient and as a result, the racist stimulus was not as potent in increasing blood pressure for these people. Another plausible explanation for these findings may be that Blacks who are isolated from friends and relatives may also be isolated from the Black community and may therefore may isolated from discussing personal accounts of racism. Racism may seem to be less prevalent or threatening among isolated individuals because they do not discuss it within a social group of peers. These individuals may also have been assimilated into majority culture to such a degree that they no longer feel that racism is their problem. Therefore racism may not be a salient stressor for Black individuals who feel socially isolated.

It was originally thought that there would be a direct, positive relationship between blood pressure during the racist scene and degree of cultural mistrust as measured by the four subscales. No relationship was found between any of the mistrust measures and blood pressure. Cynical mistrust of Whites in education and training settings was associated with cynical hostility toward people in general as measured by the Cook and Medley HO Scale. Generalized cynical hostility was strongly related to isolation which is related to a number of blood pressures during rest and

during the experimental conditions. Additionally, it was found that isolation was strongly related to mistrust of Whites in education and training settings. Cynically hostile Blacks who feel socially isolated may also feel distrustful of Whites, and may isolate themselves from contact with them, resulting in fewer stressful situations due to race. Therefore blood pressure may remain lower for racially distrustful individuals who report higher isolation scores because they are avoiding noxious social interactions.

Limitations

The NCCOM 3 Cardiovascular Monitor has difficulty deriving signals from individuals deviating from the truncated cone shape involved in the Sramek's approach and also may present problems among very dark skinned Blacks due to impedance because of denser skin pigmentation (Barbara Peterson, Medex Incorporated, technical representative, October 13, 1990). Stroke volume, hence, cardiac output may have been somewhat underestimated in such individuals, even with the use of an external ECG cable. Movement artifacts may have been present in the data from the video game challenge. The NCCOM 3 detects artifacts in fast mode, but does not detect them in research mode (BoMed Medical Manufacturing, 1986). Since the NCCOM 3 compiles data every 12 beats, it would have yielded more precise information during the films if we had examined the film data only during the key phrases exactly when blood pressure was taken instead of for the entire film viewing interval. We would have been able to tell what was occurring exactly during the three blood pressure measures.

Statistical concerns are also addressed. Interactions between race and repeated measures were not observed even though graphic depiction of the results indicates differing responsivity to the three film scenes by race. Even though there were no significant interactions between repeated measures and race, this study demonstrated that both Blacks and Whites responded to racist stimuli with blood pressure increases. Since none of the White subjects reported experiencing racism during the interview, findings concerning blood pressure increases during the racist stimulus have little generality outside of the laboratory for Whites. These findings do however have far reaching implications for Blacks who were very likely to report experiencing either racism alone or sexism in combination to racism. One way of testing the impact of racism, as a stressor, is to perform a study utilizing Blacks, who have been identified on a pretest, as experiencing high levels of racial discrimination at work and performing ambulatory monitoring on these individuals during working hours. Blacks not experiencing racial discrimination at work could be used as a control group.

Another limitation in the statistical power to detect interaction has to do with the sample size of this study. An increase in sample size may have been warranted. The benefits of an increase in sample size were outweighed by the costs. It was extremely difficult finding subjects willing to provide an hour of their spare time (often lunch breaks) to participate in this research. Black subjects were a commodity and toward the end of the study, it was extremely difficult finding Black women to participate. Additionally, the electrodes used in this study were very costly, limiting the number of subjects that could be utilized.

Due to the vicarious nature of the racist film scenes, the generalizability of this study is somewhat limited. Future research may examine the effects of direct, racism upon subjects. This raises a question of human rights and ethicality. However, to truly assess the validity of racism as a stressor that raises blood pressure among Blacks, this type of research is needed. Ambulatory monitoring may be a beneficial research avenue.

Implications

This study provides data that supports the notion that racism is a stressor associated with pathological hemodynamic responses which may ultimately contribute to the pathogenesis of essential hypertension among Blacks. Anger suppression is implicated as a possible catalyst for abnormal alpha-adrenergic responsivity. Anger suppression is a common response utilized in coping with discrimination due to race. High levels of anger suppression have been also implicated as a risk marker for essential hypertension (Julius et al., 1979; McClelland, 1979), as a direct contributor to the pathogenesis of this disease (Alexander, 1939; Rosenman, 1985) and as a moderating variable interacting with another variable which together contribute to the development of hypertension (Gentry, Chesney, Hall and Harburg, 1982). Thus, chronic exposure to racism coupled with anger suppression is thought to have important implications for the etiology of essential hypertension among Blacks.

This study also implicates chronic outwardly directed hostile responses among White females as a behavioral pathogen that may contribute to elevated blood pressure. This hostility pattern among White subjects parallels that of chronic cynicism and hostility in coronary prone

behavior (Williams et al., 1981; Barefoot, Dahlstrom, and Williams, 1983; Dembroski, James, MacDougall, Williams, Haney and Blumenthal, 1985).

Future research will attempt to delineate the cardiovascular and personality variables that allow us to discriminate the best predictors of hypertension and coronary heart disease for each race. It may be that Blacks and Whites possess different affective coping styles that are related to the disease to which they are most predisposed. For instance, Blacks may demonstrate anger suppression as a culturally adaptive response to stress. Suppressing anger has saved many Blacks from many negative experiences. This cultural response may promote pressor activity stimulated by alpha-adrenergic pathways which may contribute to sustained blood pressure elevations. White women who habitually respond by directing anger outward may break traditional social mores concerning anger expression among women and may be met with social sanctions that promote still more anger and hostility. This may contribute to a chronic cardiac activation which may relate to the higher incidence of coronary heart disease among Whites. It appears from the results of this study, that excessive amounts of anger directed outward are deleterious to the blood pressures of Whites, while excessive amounts of suppressed anger are deleterious to the pressures of Blacks. Appropriate anger expression and the eradication of racism and sexism would appear to be unequivocally helpful in the management of blood pressure for both races of women. Clinical therapy focusing upon appropriate anger expression among both races (i.e., assertiveness training) may be beneficial in reducing both the risk of hypertension and coronary heart disease. These findings make us aware that discrimination in the form

behavior (Williams et al., 1981; Barefoot, Dahlstrom, and Williams, 1983; Dembroski, James, MacDougall, Williams, Haney and Blumenthal, 1985).

Future research will attempt to delineate the cardiovascular and personality variables that allow us to discriminate the best predictors of hypertension and coronary heart disease for each race. It may be that Blacks and Whites possess different affective coping styles that are related to the disease to which they are most predisposed. For instance, Blacks may demonstrate anger suppression as a culturally adaptive response to racial stress. Suppressing anger has saved many Blacks from negative experiences based on race. This cultural response may promote a pressor activity stimulated by an alpha-adrenergic response predilection which may contribute to sustained blood pressure elevations. Deviating from the cultural responses thought to be feminine (i.e. expressions of hostility and anger directed outward) may combined with a racial response predilection among White females to respond with beta-adrenergic activation to produce systolic blood pressure increases. Socially, White women who habitually respond by directing anger outward may break traditional social mores concerning anger expression among women and may be met with social sanctions that promote still more anger and hostility. This may contribute to a chronic cardiac activation which may relate to the higher incidence of coronary heart disease among Whites. Among both races, physiological response predilections may interact with culturally based affective responses to produce blood pressure increases. It appears from the results of this study, that excessive amounts of anger directed outward are deleterious to the blood pressures of Whites, while excessive amounts of

suppressed anger are deleterious to the pressures of Blacks. Appropriate anger expression and the eradication of racism and sexism would appear to be unequivocally helpful in the management of blood pressure for both races of women. Clinical therapy focusing upon appropriate anger expression among both races (i.e., assertiveness training) may be beneficial in reducing both the risk of hypertension and coronary heart disease. These findings make us aware that discrimination in the form of racism and sexism may have cardiovascular implications for women. Hopefully, questions raised in this study will lead to new and fruitful directions in stress research.

BIBLIOGRAPHY

BIBLIOGRAPHY

- Adams, J. (1932). Some racial differences in blood pressure and morbidity in groups of white and colored workmen. American Journal of Medical Science, 184, 342.
- Alexander, F. (1939). Emotional factors in essential hypertension. Psychosomatic Medicine, 1, 173-179.
- Anderson, N. (1989). Racial differences in stress-induced cardiovascular reactivity and hypertension: current status and substantive issues. Psychological Bulletin, 105(1), 001-016.
- Anderson, N., Myers, H., Pickering, T., & Jackson, J. (1989). In press. Hypertension in blacks: psychosocial and biological perspectives. Journal of Hypertension.
- Anderson, N., Williams, R., Lane, J., Haney, T., Simpson, S., & Houseworth, S. (1986). Type A Behavior, Family History of Hypertension and Cardiovascular Responsivity Among Black Women. Health Psychology, 5(4), 393-406.
- Anderson, N., Williams, R., Lane, J., Houseworth, S., & Muranaka, M. (1987). Parental History of Hypertension and Cardiovascular stress in young black women. Journal of Psychosomatic Research, 31(6), 723-729.
- Anderson, N. (1989). Racial differences in stress-induced cardiovascular reactivity and hypertension. Current status and substantive issues. Psychological Bulletin, 105, 89-105.
- Appel, P., Kram, H., Mackabee, J., & Fleming, A. (1986). Evaluation of a continuous on-line real-time noninvasive cardiac output by bioimpedance and thermodilution in severely ill surgical patients. Critical Care Medicine, 12, 58-60.
- Armstead, C., Lawler, K., Gordon, G., Cross, J., & Gibbons, J. (1989). The relationship of racial stressors to blood pressure responses and anger expression in Black college students. Health Psychology, 8(5), 541-556.
- Arnold, B. (1960). Emotion and personality. New York: Columbia University Press.
- Averill, J. (1973). Personal control over aversive stimuli and its relationship to stress. Psychological Bulletin, 80, 286-303.
- Ax, A. (1953). The physiological differentiation between fear and anger in humans. Psychosomatic Medicine, 15, 433-442.

- Baker, F. (1987). The Afro-American life cycle: Success, failure, & mental health. Journal of the National Medical Association, 79(6) 625-633.
- Baldwin, J. (1980). Psychology of oppression. In: Vandt, A. (Ed.), Contemporary Black Thought. Beverly Hills, CA: Sage Publications.
- Barefoot, C., Dahlstrom, G., & Williams, B., (1983). Hostility, CHD incidence and total mortality: A 25-year study of 255 physicians. Psychosomatic Medicine, 41, 59-63.
- Battle, E., & Rotter, J. (1963). Children's feelings of personal control as related to social class and ethnic groups. Journal of Personality, 31, 482-490.
- Blumenthal, J. Lane, J. & Williams, R. (1985). The Inhibited power motive, type A behavior, and patterns of cardiovascular response during the thematic apperception test. Journal of Human Stress, 11(2), pp.82-92.
- NCCOM 3 Manual (1986). Bo-Med Medical Manufacturing Ltd, Irvine CA.
- Boyle, E., Griffey, W., Nichman, M. & Talbert, C. (1967). An epidemiologic study of Hypertension among racial groups of Charleston County, South Carolina. The Charleston Heart Study, Phase II. In: The epidemiology of hypertension: Proceedings of an international symposium. Stamler, J., Stmler, R., and Pullman, T. (Eds.) New York and London: Grune and Stratton. pp. 193-203.
- Breier, A., Albus, M., Pickar, D., Zahn, T. et-al (1987). Controllable and uncontrollable stress in humans: Alterations in mood and neuroendocrine and psychophysiological function. American Journal of Psychiatry, 144(11) 1419-1425.
- Brod J. (1983). Stress and arterial hypertension. In: Selye's guide to stress research. Selye, H. (ed). New York: Scientific and Academic Editions.
- Brod, J., Fencel, V., Hejl, Z., & Jirka, J. (1954). Circulatory changes underlying blood pressure elevations during acute emotional stress (mental arithmetic) on normotensive and hypertensive subjects. Clinical Science and Molecular Medicine, 18, 269-279.
- Broman, C. (1989). Social mobility and hypertension among Blacks. Journal of Behavioral Medicine, 12(2), 123-134.

- Bullock, S., & Houston, E. (1986). Perceptions of racism by Black medical students attending White medical schools. Journal of the National Medical Association.
- Burger, J. & Cooper, H. (1979). Desirability of control scale. Motivation and Emotion, 3(4), 381-393.
- Burke, A. (1982). Racism and psychological disturbance among West Indians Britain. International Journal of Social Psychiatry, 30(1&2), 50-68.
- Burton, B. & Hirschman, G. (1979). Demographic analysis: end-stage renal disease and its treatment in the United States. Clinical Nephrology, 11(2), 47-51.
- Cannon, W. (1929). Bodily changes in pain, hunger, fear and rage. N.Y.: Appleton-Centry-Crofts.
- Cassell (1976). The contribution of social environment to host resistance. American Journal of Epidemiology, 104, 107-123.
- Chape, C., Schull, W., & Schork, M. (1973). Socio-ecological stress, suppressed hostility, skin color, and black-white male blood pressure: Detroit. Psychosomatic Medicine, 35, 276-296.
- Cheek, D. (1976). Assertive Black....puzzled White. A Black perspective on assertive behavior. California: Impact Publishers. 16-17.
- Clark, V., & Harrell, J. (1982). The relationship among type A behavior, styles used in coping with racism, and Blood Pressure. The Journal of Black Psychology, 8, 89-99.
- Collins, B. (1974). Four components of the Rotter Internal-External Scale: Belief in a difficult world, a just world, a predictable world, and a politically responsive world. Journal of Personality and Social Psychology. 29(3). pp. 381-391.
- Comstock, G. (1957). An epidemiologic study of blood pressure levels in a biracial community in the Southern United States. American Journal of Hygiene, 65, 271.
- Cook, W. & Medley, D. (1954). Proposed hostility and pharisaic-virtue scales for the MMPI, Journal of Applied Psychology, 48, 414-418.
- Cope, N. & Hall, H. (1985). The health status of Black women in the U.S. Implications for health psychology and behavioral medicine. CA: Sage, A Scholarly Journal on Black Women, 2(2), 20-24.

- Corley, K., Shield, F., & M. Mauck, H.(1973). Cardiac responses associated with "yoked-chair" shock avoidance in squirrel monkeys. Psychophysiology, 12, 439-444.
- Costa, P., Zonderman, A., McCrae, R. & Williams, R. (1986). Cynicism and paranoid alienation in the Cook and Medley hostility scale. Psychosomatic Medicine, 48, 283-285.
- Crain, R., & Weisman, C., (1972). Discrimination, personality and achievement. N.Y.: Seminar Press. p.70.
- Crunch Interactive Statistical Package, Version 3. (1986). Crunch Software Corporation. 2547-22nd Avenue. San Francisco, CA
- Dean, D.(1961). Alienation: Its meaning. American Sociological Review, 26, 753-758.
- DeGood, D. (1975). Cognitive Control Factors in Vascular Stress Responses. Psychophysiology, 12(4), 399-401.
- Dembroski, T., MacDougall, J., Williams, R., Haney, M., and Blumenthal, J., (1985). Components of type A, hostility, and anger-in: Relationship to angiographic findings. Psychosomatic Medicine, 47(3), 219-233.
- Diamond, E. (1982). The role of anger and hostility in essential hypertension and coronary heart disease. Psychology Bulletin, 92, 410-433.
- Diamond, E., Schneiderman, N., Schwartz, D., Smith, J., Vorp, R., and Pasin, R. (1982). Harassment, hostility and type A as determinants of cardiovascular reactivity during competition. Journal of Behavioral Medicine, 7, 171-189.
- Dohrenwend, B. (1967). Social status, stress, and psychological symptoms. American Journal of Public Health, 57, 625-632.
- Dressler, W., dos-Santos, J., Viteri, F. (1986). Blood pressure, ethnicity, and psychosocial resources. Psychosomatic Medicine, 48(7), 509-519.
- Duh, S. & Willingham, D. (1986). An ecological view of hypertension in blacks. Journal of the National Medical Association, 78(7), 617-619.
- Durel, L., Carver, C., Spitzer, S., Llabre, M., Weintraub, J., Saab, P., and Schneiderman, N. (1989). Associations of blood pressure with self-report measures of anger and hostility among black and white men and women. Health Psychology, 8(5), 557-575.
- Durkheim, E. (1953). Sociology and philosophy. N.Y: Grove Press.

- Durkheim, E. (1973). Emile Durkheim on morality and society, selected writings. Chicago: Univeristy of Chicago Press.
- Falkowski, C. and Falk, W. (1983). Homemaking as an occupational plan: Evidence from a national longitudinal study. Journal of Vocational Behavior, 22(2), 227-242.
- Fanon, F. (1967). Black skin, White masks. N.Y.: Grove Press.
- Feuerstein, M., Labbe, E., & Kuczmierczyk, A. Health psychology and psychobiological perspective. N.Y.: Plenum Press.
- Fleming, J. (1984). The impact of college environments on Black students, N.Y.: Jossey-Bass.
- Fleming, J. (1967). Stress and satisfaction in the college years of Black students. Journal of Negro Education, 50, 307-318.
- Folsom, A., Gomez-Marin, O., Sprafka, M., Prineas, R., Eldavitch S. and Gillum, R. (1985) Trends in cardiovascular risk factors in an urban Black population, 1973-1974 to 1985: The Minnesota Heart Study. American Heart Journal, 114(5), 1199-1205.
- Friday, J. (1983). Personality and demographic variables of black and white college freshmen in two academic settings; a comparative study. Unpublished doctoral dissertation. The University of Tennessee.
- Friedman and Rosenman. (1971). Type A beavior pattern: Its associationn with coronary heart diseases. Annals of Clinical Research, 3, 300-312.
- Funkenstein, D., King, S. & Drolette, M. (1954). The direction of anger during labor, stress-inducing situation. Psychosomatic Medicine, 16, 404-413.
- Gentry, D. (1985). Relationship of anger-coping Styles and blood pressure among Black Americans, In: Anger and hostility in cardiovascular and behavioral disorders. Chesney Rosenman (Eds.) N.Y.: McGraw Hill, 139-147.
- Gentry, D., Chesney, A., Gary, H., Hall, R., & Harburg, E., (1982). Habitual anger-coping styles: I. effect on mean blood pressure and risk for essential hypertension. Psychosomatic Medicine, 44, 195-202.
- Gentry, W., Harburg, E., Hauenstein, L. (1973). Effects of anger expression/inhibition and guilt on elevated diastolic blood pressure in high/low stress and black/white females. Proceedings of the American Psychological Association, 115-116.

- Glass, D. (1977). Behavior patterns, stress and coronary heart disease. New Jersey: Erlbaum.
- Golvi, V., Teague, S., Prasad, R., Harvey, J., Voyles, W., Olson, E., Schecter, E., Thadani, V. (1986). Noninvasive evaluation of aortic stenosis severity utilizing doppler ultrasound and electric bioimpedance. Journal of American College of Cardiology, 11, 66-71.
- Graham, D. Kabler, J. & Graham, F. (1962) Physiological response to suggestions of attitudes specific for hives and hypertension. Psychosomatic Medicine, 24, 159-169.
- Grier, W. & Cobbs, P. (1968). Black rage. New York: Bantam Books.
- Grim, C., Luft, F., Miller, J., Meneely, J., Battarbee, H., Hames, C. & Dahl, L. (1980). Racial differences in blood pressure in Evans County, Georgia: Relationship to sodium and potassium intake and plasma renin activity. Journal of Chronic Disease, 33, 87-94.
- Guyton, A. (1986). Arterial pressure, In: Guyton, A., (Ed.), Textbook of medical physiology. Philadelphia: Saunders Press.
- Harburg, E., Erfurt, J., Hauenstein, L., Chape, C., Schull, W., and Schork, M. (1973). Socio-ecological stress, suppressed hostility, skin color, and black-white male blood pressure: Detroit. Psychosomatic Medicine, 35, 276-296.
- Hardy, J.D. & Smith, T.W. (1988). Cynical hostility and vulnerability to disease: social support, life stress and physiological responses to conflict. Health Psychology, 7(5), 447-459.
- Harrell, J. (1979). Analyzing black coping styles: A supplemental diagnostic system. Journal of Black Psychology, 5, pp. 99-108.
- Harrell, J. (1980). Psychological factors in hypertension: A status report. Psychological Bulletin, 87, 482-501.
- Haynes, S., Levine, S., Scotch, N., Manning, F., & Kannel, W., (1978). The relationship of psychosocial factors to coronary heart disease in the Framingham study. I. Methods and risk factors. American Journal of Epidemiology, 107, 362-383.
- Houston, B. (1972). Control over stress, locus of control and response to stress. Journal of Personality, 41, 50-58.

- Houston, B. K. (1986). Personality dimensions in reactivity and cardiovascular disease. In: Handbook of research methods in cardiovascular behavioral medicine. Schneiderman, N., Weiss, S. and Kaufmann, P. (Eds.). New York: Plenum Press. 497-499.
- Houston, B. K., Smith, M., & Cates, D. (1989). Hostility Patterns and Cardiovascular Reactivity to Stress. Psychophysiology, 26, 337-341.
- James, S. (1985). Psychosocial and environmental factors in black hypertension. In: Hypertension in Blacks: epidemiology, pathophysiology and treatment. Hall, W., Saunders, E. and Shulman, N (Eds.). Illinois: Yearbook Medical Publishers. pp. 49-57.
- James, S., LaCroix, A., Kleinbaum, D., & Strogatz, D. (1984). John Henryism and blood pressure. Differences among Black men. II. The role of occupational stressors. Journal of Behavioral Medicine, 7(3), 259-275.
- James, S., Strogatz, D., Wing, S., & Ramsey, D. (1987). Socioeconomic status, John Henryism and hypertension in Blacks and Whites. American Journal of Epidemiology, 126, 664-673.
- James. S. (1985). Psychosocial and environmental factors in Black hypertension. In: Hypertension in Blacks: epidemeology, pathophysiology and treatment. Hall, W., Saunders, E., and Shulman, N. (Eds.) Chicago, Il: Year book Medical Publishers, 115-131.
- Joe, V. (1971). Review of internal-external control construct as a personality variable. Psychological Reports, 28, 619-640.
- Johnson, B. & Remington, R. (1961). A sampling study of blood rpressure levels in White and Negro residents of Nassau, Bahamas. Journal of Chronic Diseases, 13, 39.
- Johnson, E. & Broman, C. (1987). The relationship of anger expression to health problems among black americans in a national survey. Journal of Behavioral Medicine, 10(2), 103-116.
- Johnson, E. Speilberger, C., Worden, T., & Jacobs, G. (1987). Emotional and familial determinants of elevated blood pressure in black and white adolescent males. Journal of Psychosomatic Research, 31(3), 287-300.
- Johnson, E., Spielberger, C., Worden, T., & Jacobs, G. (1987). Emotional and familial determinants of elevated blood pressure in Black and White adolescent females. Journal of Psychosomatic Research, 31(6), 731-742.

- Julius, S. and Esler, M. (1975). Autonomic nervous cardiovascular regulation in borderline hypertension. American Journal of Cardiology, 36, 685-696.
- Julius, S. and Schork, M. (1971). Borderline hypertension: A critical review. Journal of Chronic Disease, 23, 723-724.
- Julius, S. (1985). Anger in borderline hypertension. In: Chesney, M.A., & Rosenman, R.H. (Eds.), Anger & Hostility in Cardiovascular and Behavioral Disorders. N.Y.: Hemisphere/McGraw-Hill.
- Julius, S., Weder, A., Hinderliter, A. (1986). Does behaviorally induced blood pressure variability lead to hypertension? In: Matthews, K., Weiss, S., Detre, T. (Eds.), Handbook of Stress, Reactivity, and Cardiovascular Disease. N.Y.: Wiley.
- Keil, J., Tyroler, H., & Boyle, E. (1977). Hypertension: Effects of social class, and racial admixture: The results of a cohort study in the black population of Charleston, South Carolina. American Journal of Public Health, 67, 637-639.
- Kiple, K. & King, V. (1981). Another dimension to the Black diaspora: Diet, disease, racism. Cambridge England: Cambridge University Press. 122.
- Langer, A. Obrist, P. & McCubbin, J. (1978). Hemodynamic and metabolic adjustments during exercise and shock avoidance in dogs. American Journal of Physiology. Heart and Circulatory Physiology, 5, 225.
- Lawler, K., Schmied, L. (1987). The relationship of stress, Type A behavior and powerlessness to physiological responses in female clerical workers. Journal of Psychosomatic Research, 31(5), 555-566.
- Lawler, K. & Armstead, C. (1990). Type A Behavior and motivational orientation in men and women. Manuscript submitted to Personality and Social Psychology Bulletin.
- Lawler, K., & Schmied, L. (1987). The relationship of stress, type A behavior and powerlessness to physiological responses in female clerical workers. Journal of Psychosomatic Medicine, 31(5), 555-566.
- Lawler, K., & Schmied, L. (1987). The relationship of stress, type A behavior and powerlessness to physiological responses in female clerical workers. Journal of Psychosomatic Medicine, 31(5), 555-566.

- Lawler, K., Lacy, J., Lawler J., & Armstead, C. (1989). Family history of hypertension, gender, and cardiovascular responsivity during stress. Manuscript submitted to Journal of Behavioral Medicine.
- Lawler, K., Schmied, L., Armstead, C., & Lacy, J. (1990). Type A behavior, desire for control, and cardiovascular reactivity in young adult women. Journal of Social Behavior and Personality, 5(1), 135-158.
- Lawson, J. (1978). Hypertension Among Black Americans, In: Boykin, W., Anderson, J., and Yates, J. (Eds.) Research directions for Black psychologists. N.Y.: Sage Publications.
- Lefcourt, H. & Ladwig, G. (1965). The American negro: a problem in expectations. Journal of Personality and Social Psychology, 1, 377-380.
- Levi, L. (1983). Stress and coronary heart disease--causes, mechanisms, and prevention. XVIth International Congress of Internal Medicine: Psychophysiological testing in preventive cardiology (1982, Prague, Czechoslovakia). Lab for Clinical Stress Research, Stockholm, Sweden Activitas-Nervosa-Superior, 25(2), 122-128.
- Loo, C. and Rolinson, G. (1986). Alienation of ethnic minority students at a predominantly White university.
- Luft, F., Grim, C., Weinberger, M. (1980). Electrolyte and volume homeostasis in blacks. In: Hypertension in Blacks: epidemiology, pathophysiology and treatment. Hall, W., Saunders, E. and Shulman, N (Eds.). Illinois: Yearbook Medical Publishers.
- Malveaux, J. (1984). Black women and Stress. Essence Magazine April, 1984. Data from the National Women and Stress Survey. p. 74.
- Manuck, S., Craft, S. & Gold, K. (1978). Coronary prone behavior pattern and cardiovascular response. Psychophysiology, 15, 403-411.
- Manuck, S., Kasprowicz, A., and Muldoon, M. (1990). Behaviorally-evoked cardiovascular reactivity and hypertension: Conceptual issues and potential association. Annals of Behavioral Medicine, 12(1), 17-29.
- Mattar, J., Baruzzi, A., Dimeht, D., Szytkier, R., Felipe, J., Luz, D., Auler, J., Lage, D., Pileggi, F. & Jatane, A. (1986). A clinical comparison between cardiac output measured by themodilution versus noninvasive thoracic electrical impedance. Acute Care, 12, 58-60.

- Matthews, K., Glass, D., Rosenman, R., & Bortner, R., (1977). Competitive drive, pattern A, and coronary heart disease: A further analysis of some data from the Western Collaborative Study. Journal of Chronic Disease, 30, 489-498.
- McKinney, M., Hofschire, P., Buell, J., & Eliot, R. (1984). Hemodynamic and biochemical responses to stress: The necessary link between Type A behavior and cardiovascular disease. Behavioral Medicine Update, 6(4), 16-21.
- Microsoft Word Version (R) 5.0. (1983-1989) Microsoft Corporation.
- Middleton, (1963). Alienation, race and education. American Sociological Review, 28, 973-977.
- Miller, S. & Blaine, D. (1989). Individual differences in heart rate and peripheral vascular responses to an extended aversive task. Psychophysiology, 26(5), 506-513.
- Moerdyk, A. (1983). Black advancement and stress: A literature review and conceptual synthesis. Council for Scientific and Industrial Research Reports. 360. p. 141
- Musante, L., MacDougall, J., Dembroski, T. & Costa, P. (1989). Potential for hostility and dimensions of anger. Health Psychology, 8(3). pp. 343-354.
- Musante, Treiber, Strong and Levy (1990) Paper presented at the eleventh annual meeting of the Society for Behavioral Medicine. Chicago, Illinois, March 17-21, 1990.
- Myers, H. (1986). Cardiovascular and Cerebrovascular Diseases in Black Americans. In: U.S. Department of Health & Human Services. Report of the Secretary's Task Force on Black and Minority Health. 4(2). pp. 3-.
- Myers, H. (1978). Holistic definitions and measurements of states of non-health, In: L. King, V. Dixon & W. Nobles, (Eds), African philosophy: assumptions and paradigms for research on Black persons. Los Angeles: J. Alfred Common Research Series.
- Myers, H., Bastien, R., & Miles, R. (1983). Life stress, health, and blood pressure in Black college students. Journal of Black Psychology, 9(2), 1-25.
- National Black Health Providers Task Force on High Blood Pressure Education & Control. (1980). U.S. Department of Health & Human Services. NIH. Publication N. 80, 147, October.

- National Center for Health Statistics. (1985). Blood pressure levels in persons 26-74 years of age. United States, 1976-80. Trends in Blood pressure from the national health survey, Series 11, DHHS Publication Number (PHS) 85- , Hyattsville, Maryland.
- National Health and Nutrition Survey of 1971-1975. (NHANES I). (1986). Tables 44 and 45. In: U.S. Department of Health & Human Services. Report of the Secretary's Task Force on Black and Minority Health. 4(1). pp. 533-534. *Originally reported by Rowland, M. and Fulwood, R.(1983) Coronary heart disease risk factor trends in Blacks between the first and second national health and nutrition examination surveys, United States, 1971-80. Presented at American Heart Association Symposium on Coronary Heart Disease in Black Populations, March 5, 1983.
- National Health and Nutrition Survey of 1976-1980. (NHANES II). (1986). Tables 44 and 45. In: U.S. Department of Health & Human Services. Report of the Secretary's Task Force on Black and Minority Health. 4(1). pp. 533-534. *Originally reported by Rowland, M. & Fulwood, R.(1983) Coronary heart disease risk factor trends in Blacks between the first and second national health and nutrition examination surveys, United States, 1971-80. Presented at American Heart Association Symposium on Coronary Heart Disease in Black Populations, March 5, 1983.
- National Health Examination Survey of 1960-1962 (NHES I)
- Obrist, P. (1981). Cardiovascular psychophysiology. New York: Plenum Press.
- Obrist, P., Gaebelin, C., Teller, E., Langer, A. Grignoto, A, Light, A. & McCublin, J. (1978). The relationship among heart rate, carotid diastolic blood pressure, systolic blood pressure as a function of the type of stress. Psychophysiology, 15, 102-105.
- Obrist, P.A., K,C., Light, A.W. Langer, A. Grignolo and J.A. McCubbin. (1978). Behavioral-cardiac interactions: The psychosomatic hypothesis. Journal of Psychosomatic Research, 22, 301-325.
- Peffley, W. (1987). Locus of control and hostility: sex differences. The Journal of Psychology, 121(4), 329-334.
- Phares, E. (1976). Locus of control. In: London, H. and Exner, E. (Eds.), Dimensions of personality, New York: Wiley. 263-314.
- Pillay, H. (1984). The concepts, "causation," "racism" and "mental illness." International Journal of Social Psychiatry, 30(1-2), 29-39.

- Pollitzer, W. (1958). The Negroes of Charleston, South Carolina: A study of hemoglobin types, serology and morphology. American Journal of Physical Anthropology, 16, 241.
- ProComm Plus (1987). Data Storm, Inc.
- Rosenman, R. (1985). Health consequence of anger and implications for treatment. (pp. 103-229). In: Chesney, M.A., & Rosenman, R.H. (eds.), Anger & Hostility in Cardiovascular and Behavioral Disorders. N.Y.: Hemisphere/McGraw-Hill.
- Rotter, J. (1966). Generalized expectancies for internal vs. external control of reinforcement. Psychological Monographs, 80(1).
- Sapira, J., Scheib, E., Moriaty, R., & Shapiro, A. (1971). Differences in perception between hypertensive and normotensive populations. Psychosomatic Medicine, 33, 239-250.
- Saunders, G. & Bancroft, H. (1942). Blood pressure studies on negro and white men and women living in the Virgin Islands of United States. American Heart Journal, 23, 410.
- Savage, D., Stearns, J., & Friedman, R. (1979). Relationships of internal-external control, self-concept, masculinity-femininity, fear of success in Black freshman and senior women. Sex Roles, 5, 373-383.
- Schwartz, G., Weinberger, D. & Davidson, R. (1981). Cardiovascular differentiation of happiness, sorrow, anger, and fear following imagery and exercise. Psychosomatic Medicine, 43, 343-367.
- Selye, H. (1956). The stress of life. New York: McGraw-Hill.
- Sever, P., Gorden, D., Peart, W., & Beighton, P. (1980). Blood pressure and its correlates in urban and tribal Africa. Lancet, 2, 60-64.
- Shade, B. & Nichols, B. (1982). Ethnic stress: Some sociological and intracultural aspects. In: Life Stress. Day, S., (Ed.), New York, NY: Van Nostrand Reinhold Company Inc., pp. 301-308.
- Smyth, K., Call, J., Hansell, S., Sparacino, J., & Strodbeck, F. (1978). Type A behavior pattern and hypertension among inner-city black women. Nursing Research, 27(1) 30-35.
- Spielberger, C., Johnson, E., Russell, S., Crane, R., Jacobs, G. & Worden, T. (1985). The experience and expression of anger: Construction and validation of an anger expression scale (pp. 5-30). In: Chesney, M.A., and Rosenman, R.H. (Eds.), Anger & Hostility in Cardiovascular and Behavioral Disorders. N.Y.: Hemisphere/McGraw-Hill.

- State Center for Health Statistics. Tennessee Department of Health and Environment. Special Report number two. January 1988. The Status of Black and Minority Health in Tennessee. pp. 1-69.
- Steele, R. (1978). The relationship of race, sex, social class and social mobility to depression in normal adults. Journal of Social Psychology, 104(1), 37-47.
- Stephoe, A. & Ross, A. (1981). Psychophysiological reactivity and the prediction of cardiovascular disorders. Journal of Psychosomatic Research, 25, 23-31.
- Strube, M. & Lott, C. (1985). Type A behavior pattern and the judgment of noncontingency: Mediating roles of mood and perspective. Journal of Personality and Social Psychology, 49(2), 510-519.
- Suarez, Williams, Harlan, Peoples, Kuhn and Schanber (1990) Cook-Medley HO scores predict neuroendocrine, testosterone and cardiovascular responses to harrassment. Paper presentaed at eleventh annual meeting of The Society of Behavioral Medicine. April 18 21.
- Sutherland, M. & Harrell, J. (1986-1987). Individual differences in physiological responses to fearful, racially noxious, and neutral imagery. Imagination, Cognition and Personality, 6, 133-150.
- Terrell, S., & Terrell., J. (1981). An inventory to measure cultural mistrust among Blacks. The Western Journal of Black Studies, 5(3), 180-184.
- Thomas, H. & Dobbins, J. (1986). The color line and social distance in the genesis of essential hypertension. Journal of the National Medical Association, 78(6), 532-536.
- Tischenkel, N., Saab, P., Schneiderman, N., Nelesen, R., Pasin, R., Godstein, D., Spitzer, S., Woo-Ming, R. & Wiedler, D. (1989). Cardiovascular and neurohemoral responses to behavioral challenge as a function of race and sex. Health Psychology, 8(5), 503-524.
- Treiber, F., Musante, L., Braden, D., Arensman, F., Strong, W., Levy, M. & Leverett, S. (1990). Racial differences in hemodynamic responses to the cold face stimulus in children and adults, Psychosomatic Medicine, 62, 286-296.
- Triandis, H., Feldman, J., Weldon, D., & Harvey (1975) Eco-system distrust in the Black Ghetto. In: Variations in Black and White perceptions of the social environment. H. Triandis (Ed.). Urbana, Illionis: University of Illinois Press.

- Tyroler, H. & James, S. (1978). Blood pressure and skin color. American Journal of Public Health, 68(12), 1170-1172.
- Vasey, M. & Thayer, I. (1987). The continuing problem of false positives in repeated measures ANOVA in psychophysiology: A Multivariate solution. Psychophysiology, 24(4), 479-486.
- Waldron, Nowotarski, Friemer, Henry, Post and Willen (1982),
- Williams, B. & Vantress, R. (1969). Relation between internal-external control and aggression. Journal of Psychology, 71, 59-61.
- Williams, R. (1975). Cardiology. Textbook of Black-related Diseases. NY: McGraw-Hill. pp.360-368.
- Williams, R., Haney, T., & Blumenthal, J. (1981). Psychological and physiological correlates of type A behavior pattern. In: Perspectives in behavioral medicine. Weiss, S., Herd, J., and Fox, B. (eds). NY: Academic Press. pp. 401-405.
- Wilson, T. (1987). Africa, Afro-Americans and hypertension: an hypothesis. In: The African exchange: Toward a biological history of Black people. Kiple, K. (Ed.). Durham and London: Duke University Press.
- Wolf, S., Cardona, P., Shepard, E., & Wolff, H. (1955). Life stress and essential hypertension. A study of circulatory adjustments in man. Maryland: Williams and Wilkins.
- Wolf, S. & Wolff, H. (1951). A summary of experimental evidence relating life stress to the pathogenesis of essential hypertension in man. In: Hypertension: A Symposium. Bell, E. (Ed.) Minnesota: University of Minnesota Press. p. 288.

APPENDICES

APPENDIX 1

QUESTIONNAIRE PACKET

Subject # _____

Participant Information Sheet

1. Marital Status: Married Single Widowed Divorced
2. If married, what is your husband's occupation?

3. How many years of education does your husband have? _____
4. What is your occupation? _____
- 4a. Circle your approximate annual family income:
 - (1) \$0-\$9,999
 - (2) \$10,000-\$14,999
 - (3) \$15,000-\$19,999
 - (4) 20,000-\$24,999
 - (5) \$25,000-\$29,999
 - (6) \$30,000-\$34,999
 - (7) \$35,000+
5. How many years of education have you had? _____
6. Do you have any children? _____ If yes, please list by sex and age:
 - a. Male or Female _____ Age _____
 - b. Male or Female _____ Age _____
 - c. Male or Female _____ Age _____
 - d. Male or Female _____ Age _____
 - e. Male or Female _____ Age _____
7. What is your age? _____ Your height? _____
Your weight? _____ Your race? _____.
8. Do you smoke cigarettes? _____
9. If yes, how many packs per day? _____
10. If you used to smoke, but have quit: how many years did you smoke? _____
11. How much did you smoke? _____
12. How long has it been since you quit? _____

QUESTIONNAIRE PACKET

Subject # _____

Participant Information Sheet

1. Marital Status: Married Single Widowed Divorced
2. If married, what is your husband's occupation?

3. How many years of education does your husband have? _____
4. What is your occupation? _____
- 4a. Circle your approximate annual family income:
 - (1) \$0-\$9,999
 - (2) \$10,000-\$14,999
 - (3) \$15,000-\$19,999
 - (4) 20,000-\$24,999
 - (5) \$25,000-\$29,999
 - (6) \$30,000-\$34,999
 - (7) \$35,000+
5. How many years of education have you had? _____
6. Do you have any children? _____ If yes, please list by sex and age:
 - a. Male or Female _____ Age _____
 - b. Male or Female _____ Age _____
 - c. Male or Female _____ Age _____
 - d. Male or Female _____ Age _____
 - e. Male or Female _____ Age _____
7. What is your age? _____ Your height? _____
Your weight? _____ Your race? _____.
8. Do you smoke cigarettes? _____
9. If yes, how many packs per day? _____
10. If you used to smoke, but have quit: how many years did you smoke? _____
11. How much did you smoke? _____
12. How long has it been since you quit? _____

13. Do you exercise regularly? _____
14. If yes, what type of exercise do you do? _____
15. How many times a week do you do it? _____

Do you have now, or have you ever had any of the following health problems? If yes, please make a check mark below:

16. _____ high blood pressure
17. _____ heart attack
18. _____ stroke
19. _____ hardening of the arteries
20. _____ severe depression
21. _____ diabetes
- 21a. _____ other. What?

22. If yes, do you take any medication for it? _____
What?

If your mother or father has had any of the following health problems, please check below:

	Neither	Mother	Father	Both	Health Problem
23.	_____	_____	_____	_____	high blood pressure
24.	_____	_____	_____	_____	heart attack
25.	_____	_____	_____	_____	stroke
26.	_____	_____	_____	_____	hardening of the arteries
27.	_____	_____	_____	_____	diabetes
27a.	_____	_____	_____	_____	other.
What?	_____	_____	_____	_____	

- 27b. Does your parent take medication for it?
What?

If you do not have any information about your parents,
please check below:

28. _____ I do not know the health history of my mother.
29. _____ I do not know the health history of my father.
30. Have you had a hysterectomy or gone through menopause?
yes no

Section I.

Below you will find a series of statements. Please read each statement carefully and respond to it by expressing the extent to which you believe the statement applies to you. For all items, a response from 1 to 7 is required. **Please read the information inside of the box.**

- 1 The statement doesn't apply to me at all.
- 2 The statement usually doesn't apply to me.
- 3 Most often, the statement does not apply.
- 4 I am unsure about whether or not the statement applies to me, or it applies to me about half of the time.
- 5 The statement applies more often than not.
- 6 The statement usually applies to me.
- 7 The statement always applies to me.

Please CIRCLE the number that best reflects your belief about each item. It is important that you respond to ALL the items.

1. I prefer a job where I have a lot of control over what I do and when I do it. 1 2 3 4 5 6 7
2. I enjoy political participation because I want to have as much of a say in running government as possible. 1 2 3 4 5 6 7
3. I try to avoid situations where someone else tells me what to do. 1 2 3 4 5 6 7
4. I would prefer to be a leader rather than a follower. 1 2 3 4 5 6 7
5. I enjoy being able to influence the actions of others. 1 2 3 4 5 6 7
6. I am careful to check everything on an automobile before I leave for a long trip. 1 2 3 4 5 6 7

- | | |
|---|---|
| 1 | Doesn't apply at all. |
| 2 | Usually doesn't apply . |
| 3 | Most often, does not apply. |
| 4 | Unsure or applies about half of the time. |
| 5 | Applies more often than not. |
| 6 | Usually applies. |
| 7 | Always applies. |

- | | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7. Others usually know what is best for me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8. I enjoy making my own decisions. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9. I enjoy having control over my own destiny. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 10. I would rather someone else take over the leadership role when I'm involved in a group project. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 11. I consider myself to be generally more capable of handling situations than others are. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 12. I'd rather run my own business and make my own mistakes than listen to someone else's orders. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 13. I like to get a good idea of what a job is all about before I begin. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 14. When I see a problem, I prefer to do something about it rather than sit by and let it continue. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15. When it comes to orders, I would rather give than receive them. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 16. I wish I could push many of life's daily decisions off on someone else. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

- | | |
|---|---|
| 1 | Doesn't apply at all. |
| 2 | Usually doesn't apply . |
| 3 | Most often, does not apply. |
| 4 | Unsure or applies about half of the time. |
| 5 | Applies more often than not. |
| 6 | Usually applies. |
| 7 | Always applies. |

17. When driving, I try to avoid putting myself in a situation where I could be hurt by someone else's mistake.

1 2 3 4 5 6 7

18. I prefer to avoid situations where someone else has to tell me what it is I should be doing.

1 2 3 4 5 6 7

19. There are many situations in which I would prefer only one choice rather than having to make a decision.

1 2 3 4 5 6 7

20. I like to wait and see if someone else is going to solve a problem so that I don't have to be bothered with it.

1 2 3 4 5 6 7

Section II.

This is a questionnaire to find out the way in which certain important events in our society affect different people. Each item consists of a pair of alternatives lettered a or b. Please select the one statement of each pair (and only one) which you more strongly believe to be more true rather than the one you think you should choose or the one you would like to be true. This is a measure of personal belief: obviously there are no right or wrong answers.

In some instances, you may discover that you believe both statements or neither one. In such a case, be sure to select the one you more strongly believe to be the case as far as you're concerned. Also try to respond to each item independently when making your choice; do not be influenced by your previous choices.

1. a. Children get into trouble because their parents punish them too much.
b. The trouble with most children nowadays is that their parents are too easy with them.
2. a. Many of the unhappy things in people's lives are partly due to bad luck.
b. People's misfortunes result from the mistakes they make.
3. a. One of the major reasons why we have wars is because people don't take enough interest in politics
b. There will always be wars, no matter how hard people try to prevent them
4. a. In the long run people get the respect they deserve in this world
b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries
5. a. The idea that teachers are unfair to students is nonsense
b. Most students don't realize the extent to which their grades are influenced by accidental happenings
6. a. Without the right breaks, one cannot be an effective leader
b. Capable people who fail to become leaders have not taken advantage of their opportunities

7. a. No matter how hard you try, some people just don't like you
b. People who can't get others to like them don't understand how to get along with others
8. a. Heredity plays the major role in determining one's personality
b. It is one's experiences in life which determine what they're like
9. a. I have often found that what is going to happen will happen
b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action
10. a. In the case of the well prepared student, there is rarely if ever, such a thing as an unfair test
b. Many time exam question tend to be so unrelated to course work that studying is really useless
11. a. Becoming a success is a matter of hard work, luck has little or nothing to do with it
b. Getting a good job depends mainly on being in the right place at the right time
12. a. The average citizen can have an influence in government decisions
b. This world is run by people in power, and there is not much the little guy can do about it
13. a. When I make plans, I am almost certain that I can make them work
b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow
14. a. There are certain people who are just no good
b. There is some good in everybody
15. a. In my case, getting what I want has little or nothing to do with luck
b. Many times we might just as well decide what to do by flipping a coin
16. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first
b. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it

17.
 - a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control
 - b. By taking an active part in political and social affairs, the people can control world events
18.
 - a. Most people don't realize the extent to which their lives are controlled by accidental happenings
 - b. There really is no such thing as "luck"
19.
 - a. One should always be willing to admit mistakes
 - b. It is usually best to cover up one's mistakes
20.
 - a. It is hard to know whether or not a person really likes you
 - b. How many friends you have depends upon how nice a person you are
21.
 - a. In the long run, the bad things that happen to us are balanced by the good ones
 - b. Most misfortunes are the result of lack of ability, ignorance, laziness or all three
22.
 - a. With enough effort, we can wipe out political corruption
 - b. It is difficult for people to have much control over the things politicians do in office
23.
 - a. Sometimes I can't understand how teachers arrive at the grades I get
 - b. There is a direct connection between how hard I study and the grades I get
24.
 - a. A good leader expects people to decide for themselves what they should do
 - b. A good leader makes it clear to everybody what their jobs are
25.
 - a. Many times I feel that I have little influence over the things that happen to me
 - b. It is impossible for me to believe that chance or luck plays an important role in my life
26.
 - a. People are lonely because they don't try to be friendly
 - b. There's not much use in trying hard to please people, if they like you they like you

27. a. There is too much emphasis on athletics in high school
 b. Team sports are an excellent way to build character
28. a. What happens to me is my own doing
 b. Sometimes I feel that I don't have enough control over the direction my life is taking
29. a. Most of the time I can't understand why politicians behave the way they do
 b. In the long run, the people are responsible for bad government on a national, as well as local level

Section III.

I. Would the following traits and qualities describe you?

	Yes	No
Being hard-driving and competitive	_____	_____
Usually pressed for time	_____	_____
Being bossy or dominating	_____	_____
Having a strong need to excel in most things	_____	_____
Eating too quickly	_____	_____

II. How do you feel at the end of an average day of work or school?

Often feel very pressed for time	_____	_____
Work stays with me so I am thinking about it after working/school hours	_____	_____
Often feel uncertain, uncomfortable, or dissatisfied with how well I am doing	_____	_____
Do you get upset when you have to wait for anything?	_____	_____
Work/School often stretches me to the very limits of my energy and capacity	_____	_____

Section IV.

Please read each statement and decide whether it is true as applied to you or false as applied to you.

T or F

- | | | |
|-------|-----|---|
| _____ | 1. | When I take a new job, I like to be tipped off on who should be gotten next to. |
| _____ | 2. | When someone does me wrong, I feel I should pay him back if I can just for the principle of the thing. |
| _____ | 3. | I prefer to pass by school friends, or people I know but have not seen for a long time, unless they speak to me first. |
| _____ | 4. | I have often tried to take orders from someone who did not know as much as I did. |
| _____ | 5. | I think a great many people exaggerate their misfortunes in order to gain the sympathy and help of others. |
| _____ | 6. | It takes a lot of argument to convince most people of the truth. |
| _____ | 7. | I think most people would lie to get ahead. |
| _____ | 8. | Someone has it in for me. |
| _____ | 9. | Most people are honest chiefly through fear of being caught. |
| _____ | 10. | Most people will use somewhat unfair means to gain profit or an advantage rather than lose it. |
| _____ | 11. | I commonly wonder what hidden reason another person may have for doing something for me. |
| _____ | 12. | It makes me impatient to have people ask my advice or to otherwise interrupt me when I am working on something important. |
| _____ | 13. | I feel that I have often been punished without cause. |

T or F

- _____ 14. I am against giving money to beggars.
- _____ 15. Some of my family members have habits that bother and annoy me very much.
- _____ 16. My relatives are nearly all in sympathy with me.
- _____ 17. My way of doing things is apt to be misunderstood by others.
- _____ 18. I don't blame anyone for trying to grab everything he can get in this world.
- _____ 19. No one cares much what happens to you.
- _____ 20. I can be friendly with people who do things which I consider wrong.
- _____ 21. It is safer to trust nobody.
- _____ 22. I don't blame a person for taking advantage of someone who lays himself open to it.
- _____ 23. I have often felt that strangers were looking at me critically.
- _____ 24. Most people make friends because friends are likely to be useful to them.
- _____ 25. I am sure I am being talked about.
- _____ 26. I am likely not to speak to people until they speak to me.
- _____ 27. Most people inwardly dislike putting themselves out to help other people.
- _____ 28. I tend to be on my guard with people who are somewhat more friendly than I had expected.
- _____ 29. At periods, my mind seems to work more slowly than usual.
- _____ 30. I enjoy the excitement of a crowd.
- _____ 31. I find it hard to set aside a task that I have undertaken, even for a short time.

- _____ 32. I like to let people know where I stand on things.
- T or F**
- _____ 33. I am apt to pass up something I want to do when others feel that it isn't worth doing.
- _____ 34. I have sometimes stayed away from another person because I fear doing or saying something that I might regret afterwards.
- _____ 35. I would certainly enjoy beating a crook at his own game.
- _____ 36. Religion gives me no worry.
- _____ 37. I have at times had to be rough with people who were rude or annoying.
- _____ 38. I feel sure that there is only one true religion.
- _____ 39. There are certain people whom I dislike so much that I am inwardly pleased when they are catching it for something they have done.
- _____ 40. I am often inclined to go out of my way to win a point with someone who has opposed me.
- _____ 41. I am often said to be hotheaded.
- _____ 42. The man who had most to do with me when I was a child (such as my father, stepfather, etc.) was very strict with me.
- _____ 43. Lightening is one of my fears.
- _____ 44. When a man is with a woman, he is usually thinking about things related to sex.
- _____ 45. I do not try to cover up my poor opinion or pity of a person so that he won't know how I feel.
- _____ 46. I have frequently worked under people who seem to have things arranged so that they get credit for good work, but are able to pass off mistakes on to those under them.
- _____ 47. I strongly defend my own opinions as a rule.

T or F

- _____ 48. People can pretty easily change me even though I thought that my mind was already made up on a subject.
- _____ 49. Sometimes I am sure that other people can tell what I am thinking.
- _____ 50. A larger number of people are guilty of bad sexual conduct.

Section V.

Directions: Everyone feels angry or furious from time to time, but people differ in ways that they react when they are angry. A number of statements are listed below which people have used to describe their reactions when they feel angry or furious. Read each statement and the circle the number to the right of the statement that indicates how often you generally react or behave in the manner described. There are no right or wrong answers. Do not spend too much time on any one statement.

When Angry or Furious.....		Almost Never	Some- times	Often	Almost Always
1.	I control my temper	1	2	3	4
2.	I express my anger	1	2	3	4
3.	I keep things in	1	2	3	4
4.	I am patient with others	1	2	3	4
5.	I pout or sulk	1	2	3	4
6.	I withdraw from people	1	2	3	4
7.	I make sarcastic remarks	1	2	3	4
8.	I keep my cool	1	2	3	4
9.	I do things like slam doors.	1	2	3	4
10.	I boil inside and don't show it	1	2	3	4
11.	I control my behavior	1	2	3	4
12.	I argue with others	1	2	3	4
13.	I tend to harbor grudges	1	2	3	4
14.	I strike out at whatever infuriates me	1	2	3	4
15.	I can stop myself from losing my temper	1	2	3	4
16.	I am secretly quite critical of others	1	2	3	4
17.	I am angrier than I am willing to admit	1	2	3	4
18.	I calm down faster than most people	1	2	3	4
19.	I say nasty things	1	2	3	4

When Angry or Furious.....		Almost Never	Some- times	Often	141 Almost Always
20.	I try to be tolerant and understanding	1	2	3	4
21.	I'm irritated a great deal more than people are aware of	1	2	3	4
22.	I lose my temper	1	2	3	4
23.	If someone annoys me, I'm apt to tell him or her how I feel	1	2	3	4
24.	I control my angry feelings	1	2	3	4

Section VI.

I. **Directions:** Please read each statement and mark which statement best expresses how likely you are to react in the manner described when you are angry or furious. There are no right or wrong answers. Do not spend too much time on any one statement.

WHEN ANGRY OR FURIOUS:

	I am Not too Likely	I am Somewhat Likely	I am Very Likely	
A.	1	2	3	to get tense or worried.
B.	1	2	3	to try to act as though nothing happened.
C.	1	2	3	to take it out on others.
D.	1	2	3	to get it off my chest.
E.	1	2	3	to get a headache.
F.	1	2	3	to keep it to myself.
G.	1	2	3	to blame someone else.
H.	1	2	3	to talk to a friend or relative.
I.	1	2	3	to feel weak.
J.	1	2	3	to apologize even though I'm right.
K.	1	2	3	to feel depressed.
L.	1	2	3	to get nervous.

REVISED CMI

Directions:

Enclosed are some statements concerning beliefs, opinions, and attitudes about Blacks and Whites. Read each statement carefully and give your honest feelings about the beliefs and attitudes expressed. Indicate the extent to which you agree by **circling the number that best describes how much you agree with the statements below.**

The higher the number you choose for the statement, the more you agree with that statement. For example if you "moderately agree" with a statement, you would choose the numbers 4 and 5 which appear above the label "Moderately agree." If you chose the number 5, this means you agree more with the statement than if you had chosen the number 4. The same principle applies for the other labels. The higher the number you choose, the more you agree with the statement.

Finally, there are no right or wrong answers, only what is right for you. If in doubt, circle the number which seems to most nearly express your present feelings about the statement. **Please answer all items.**

0-----1	2-----3	4-----5	6-----7	8-----9
Not in the	Slightly	Moderately	Very Much	Entirely
least agree	agree	agree	agree	agree

1. Whites are usually fair to all people regardless of race.

0-----1 2-----3 4-----5 6-----7 8-----9

2. White teachers teach subjects so that they favor whites.

0-----1 2-----3 4-----5 6-----7 8-----9

3. White teachers are more likely to slant the subject matter to make Blacks look inferior.

0-----1 2-----3 4-----5 6-----7 8-----9

4. White teachers deliberately ask Black students questions which are difficult so they will fail.

0-----1 2-----3 4-----5 6-----7 8-----9

5. There is no need for a Black person to work hard to get ahead financially because whites will take what you earn anyway.

0-----1 2-----3 4-----5 6-----7 8-----9

6. Black citizens can rely on white lawyers to defend them to the best of his or her ability.

0-----1 2-----3 4-----5 6-----7 8-----9

0-----1	2-----3	4-----5	6-----7	8-----9
Not in the	Slightly	Moderately	Very Much	Entirely
least agree	agree	agree	agree	agree

7. Black parents should teach their children not to trust white teachers.

0-----1 2-----3 4-----5 6-----7 8-----9

8. White politicians will promise blacks a lot but deliver little.

0-----1 2-----3 4-----5 6-----7 8-----9

9. White policemen will slant a story to make Blacks appear guilty.

0-----1 2-----3 4-----5 6-----7 8-----9

10. White politicians usually can be relied on to keep the promises they make to Blacks.

0-----1 2-----3 4-----5 6-----7 8-----9

11. Blacks should be suspicious of a white person who tries to be friendly.

0-----1 2-----3 4-----5 6-----7 8-----9

12. Whether you should trust a person or not is not based on his race.

0-----1 2-----3 4-----5 6-----7 8-----9

13. Probably the biggest reason whites want to be friendly with Blacks is so they can take advantage of them.

0-----1 2-----3 4-----5 6-----7 8-----9

14. A Black person can usually trust his or her white co-workers.

0-----1 2-----3 4-----5 6-----7 8-----9

15. If a white person is honest in dealing with Blacks, it is because of fear of being caught.

0-----1 2-----3 4-----5 6-----7 8-----9

16. A Black person can not trust a white judge to evaluate him or her fairly.

0-----1 2-----3 4-----5 6-----7 8-----9

17. A Black person can feel comfortable making a deal with a white person simply by a handshake.

0-----1 2-----3 4-----5 6-----7 8-----9

18. Whites deliberately pass laws designed to block the progress of Blacks.

0-----1 2-----3 4-----5 6-----7 8-----9

19. There are some whites who are trustworthy enough to have as close friends.

0-----1 2-----3 4-----5 6-----7 8-----9

20. Blacks should not have anything to do with whites since they can not be trusted.

0-----1 2-----3 4-----5 6-----7 8-----9

- | | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |
|--|-------------|----------|------------|-----------|----------|
| | Not in the | Slightly | Moderately | Very Much | Entirely |
| | least agree | agree | agree | agree | agree |
| 21. It is best for Blacks to be on their guard when among whites. | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |
| 22. Of all ethnic groups, whites are really the Indian-givers. | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |
| 23. White friends are least likely to break their promise. | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |
| 24. Blacks should be cautious about what they say in the presence of whites since whites will try to use it against them. | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |
| 25. Whites can rarely be counted on to do what they say. | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |
| 26. Whites are usually honest with Blacks. | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |
| 27. Whites are as trustworthy as members of any other ethnic group. | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |
| 28. Whites will say one thing and do another. | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |
| 29. White politicians will take advantage of Blacks every chance they get. | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |
| 30. When a white teacher asks a Black student a question, it is usually to get information which can be used against him or her. | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |
| 31. White policemen can be relied on to exert an effort to apprehend those who commit crimes against Blacks. | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |
| 32. Black students can talk to a white teacher in confidence without fear that the teacher will use it against him or her later. | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |
| 33. Whites will usually keep their word. | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |
| 34. White policemen usually do not try to trick Blacks into admitting they committed a crime which they didn't commit. | 0-----1 | 2-----3 | 4-----5 | 6-----7 | 8-----9 |

THE UNIVERSITY OF TENNESSEE
KNOXVILLE



Cheryl Armstead
409 Austin Peay
Psychology Department
(615) 974-8458

College of
Liberal Arts

Department of
Psychology

Dear future participant:

First of all, please let me introduce myself. My name is Cheryl Armstead. I am a doctoral student in health psychology at the University of Tennessee. I am conducting my dissertation research with Dr. Kathleen Lawler. This research is designed to explore the relationship between social stress, heart rate and blood pressure in women. Participation entails: 1) filling out a packet of questionnaires which are designed to measure personality factors thought to be important to how people physically handle stress and 2) briefly playing a nintendo game 3) participating in a laboratory session during which your heart rate and blood pressure will be monitored while watching movie scenes. You will also participate in a five minute interview pertaining to social stress that you may have personally encountered.

To this extent, I am interested in finding women who would like to take part in my research. To successfully carry out my study, I will need your cooperation and a minimal amount of your time. As an incentive to participate, the names of all participants will be entered in a cash drawing. In this drawing, there are two prizes for \$75.00 cash and one prize of \$150.00 cash. You may win only one prize. These drawings will occur at the conclusion of the research project.

The questionnaire packet is to be completed at your leisure. Within a couple weeks after receiving your packet, a research assistant will contact you to schedule an appointment. The lab session will take about an hour and will occur in the Psychophysiological Laboratory, room 409 Austin Peay Building University of Tennessee. You will be asked to bring your completed questionnaire packet with you.

I would greatly appreciate your cooperation and time-contribution. If you have any questions or comments about my study or your involvement in it, I'll be happy to talk to you. I can be contacted at (615) 974-8458. Thank you for your help.

Sincerely,
Cheryl Armstead, researcher

Subject# _____

INFORMED CONSENT

This study is designed to explore the effects of social stress on the cardiovascular systems of women. We have already given you a packet of questionnaires. They are designed to measure personality factors thought to be important in how women physically handle stress. There will also be a laboratory session.

In the laboratory session, we will measure your body's responses to mild stressors in the form of three, three minute film segments, some of which may be unpleasant. We will be measuring your heart rate, and blood pressure throughout the session. You will play a brief nintendo game. In addition, you will be asked to describe an incident pertaining to social stress. This interview will be audiotaped. There will be no identifying information on the audiotape and only Dr. Lawler and Cheryl Armstead will have access to the tape. The total time for the session is about an hour, of which 35 minutes are rest intervals.

Any questions you have concerning the procedures of this project will be answered and results of the final analysis will be available to you. Should you have any subsequent questions, you may contact either Dr. Kathleen Lawler or Cheryl Armstead at room 409 Austin Peay Building.

_____ By checking this line, I am indicating that I would consent to be recontacted to complete additional questionnaires at a later date. This is optional.

I understand, should slight emotional discomfort occur, I will be able to discuss my feelings with the investigator. I understand that there is no penalty for nonparticipation. I also understand that I or the researcher may terminate my participation, if I or the researcher feels it is in my best interest to do so.

I understand that the results of the research study may be published, but that my name or identity will not be revealed. In addition, all questionnaires, tapes and physiological records will be stored in a locked file with limited access to the key.

I volunteer to participate in the investigation conducted by Dr. Kathleen Lawler and Cheryl Armstead. I have read the above description and I understand that I will have any questions regarding the nature of the experiment addressed upon completing the experiment. I also realize that I may choose not to participate or choose to terminate the experimental session at any time by request without penalty.

Date _____ Printed Name _____

Signature _____

Campus Address _____

Campus Phone Number _____

Researcher's Signature _____

FILM INSTRUCTIONS

You will be asked to view film scenes, some of which you may find unpleasant. Your heart rate and blood pressure will be taken while you view each scene. Please feel free to react to them naturally. In other words "get into" what you are seeing and hearing, if that's what you normally do. Try to imagine yourself in the main character's place. There is no right or wrong way of behaving. This is not a test. Be yourself. After you view each scene, you will be asked to fill out a short checklist. Throughout the film session, recorded instructions will be presented. They will help you remember what to do. Please follow these instructions precisely. Later, if you feel the need, I will discuss your feelings about what you saw. You may ask questions regarding the research at this time. Thank you.

Order _____
Subject # _____

MOOD CHECKLIST

DIRECTIONS: Below you will find words which describe different kinds of moods and feelings. For **each word**, please circle **the number of the statement** that **best** describes how you felt when you saw the each scene.

****** Circling a number 2 by the word happy and 1's by the rest of the words means that you felt somewhat happy when you viewed the scene and not at all angry, depressed, bored, peaceful or afraid when you watched the scene.

Example: When I watched the scene , I felt:

1= Not at all
2= Somewhat
3= Very

I. When I watched the first scene, I felt:

1. happy	1	2	3
2. angry	1	2	3
3. afraid	1	2	3
4. bored	1	2	3
5. depressed	1	2	3
6. peaceful	1	2	3

II. When I watched the second scene, I felt:

1. afraid	1	2	3
2. depressed	1	2	3
3. peacefu	1	2	3
4. bored	1	2	3
5. happry	1	2	3
6. angry	1	2	3

III. When I watched the last scene, I felt:

1. bored	1	2	3
2. peaceful	1	2	3
3. angry	1	2	3
4. afraid	1	2	3
5. happy	1	2	3
6. depressed	1	2	3

INTERVIEW

First of all I want you to know that this interview will be a confidential. It will be audiotaped, but there will be no identifiers, such as names or places of business on the tape. Access to these interview will be limited to myself and one interview rater. It is important that you feel free to say exactly how you really feel.

1. Almost everyone has felt stressful at one time or another. Will you share with me an instance during which you felt stressful in relation to other people?
2. Was any of this stress related to being treated unfairly or discriminated against because of your gender or race OR were these things not related to the situation? Have you ever in your life experienced sexism/ racism?
3. Will you describe what happened as vividly as possible? Tell me **what** you thought and **how you felt emotionally**.
4. Were you angry? How angry? How did you handle your anger in this situation? Do you tend to hold your anger in or let it out as a rule?
5. How much control did you feel that you had over the situation
6. Did you want to retaliate: with words, with action, with thoughts?
7. Do you feel that this incident changed the way you now look at men/Whites? How do you generally feel about men/Whites because of the sexism/racism you encountered?

Conclusion:

8. Is there anything that you would like to add?

INTERVIEW RATING FORM

SUBJECT # _____

(A) WHICH IS MORE OF A SOURCE OF DISCRIMINATION?

- 4 Both race and gender
- 3 Race
- 2 Gender
- 1 Neither

-
- 4 = Strongly agree
 - 3 = Agree
 - 2 = Uncertain
 - 1 = Strongly disagree

(B) 0 1 2 3 4

The subject's voice was loud when discussing the incident.

(C) 0 1 2 3 4

The subject reported having little control over the situation.

(D) 0 1 2 3 4

The subject reported feeling hostility specifically toward members of the opposite race/gender as a result of the incident.

(E) 0 1 2 3 4

The subject reported retaliating in some way.

(F) POTENTIAL FOR HOSTILITY

0 No statements with possible hostility content or structure, and no hostility in voice stylistics.

1 Some (one or two statements) hostile content, but no hostility in voice stylistics.

2 Two or three potentially hostile statements and perhaps some suggestion of hostility in voice stylistics.

3 Three or more content admissions of hostility or anger and some evidence of hostility in attitude or voice stylistics.

4 Frequent hostility expressed in attitude or voice stylistics.

(G) ANGER-IN

0 No statements of expressing irritation or anger openly and several statements reflecting and unwillingness to show anger outward.

1 No more than one admission of expressing anger openly and more than one admission of unwillingness to show anger openly.

2 Expresses some reluctance to show irritation or anger openly, although will do so in appropriate circumstances and/or admits that anger is sometimes held in.

3 Generally admits to outward expressions of anger.

4 Frequent examples of expressing irritation or anger openly, in a belligerent manner.

(H) Briefly summarize the main theme of the interview in the space below.

Debriefing Statement

The purpose of this research was to examine the effects of racism directed toward Blacks on blood pressure in White and Black females. This information will be used as part of a dissertation requirement of The University of Tennessee Department of Psychology and may be later published. All information will remain confidential.

Your blood pressure at the start of this experiment was _____. This reading was obtained for use in psychological research and should not be used as a medical diagnostic tool. We advise you to consult medical personnel, if you wish a diagnostic reading. Thank you for participating.

Dr. Kathleen Lawler and
Cheryl Armstead, researchers

APPENDIX 2

PROCOMM SCRIPT FILE FOR MEDEX

```
GETFILE:
MESSAGE "ENTER THE FILE NAME"
GET S0
ISFILE S0
IF SUCCESS
    MESSAGE "FILE ALREADY EXISTS"
    GO TO GETFILE
ENDIF
DOS PAUSE
CLEAR
LOG OPEN S0
LOOP:
WAITFOR "/"
TIME S1 1
MESSAGE S1
GOTO LOOP
```

APPENDIX 3

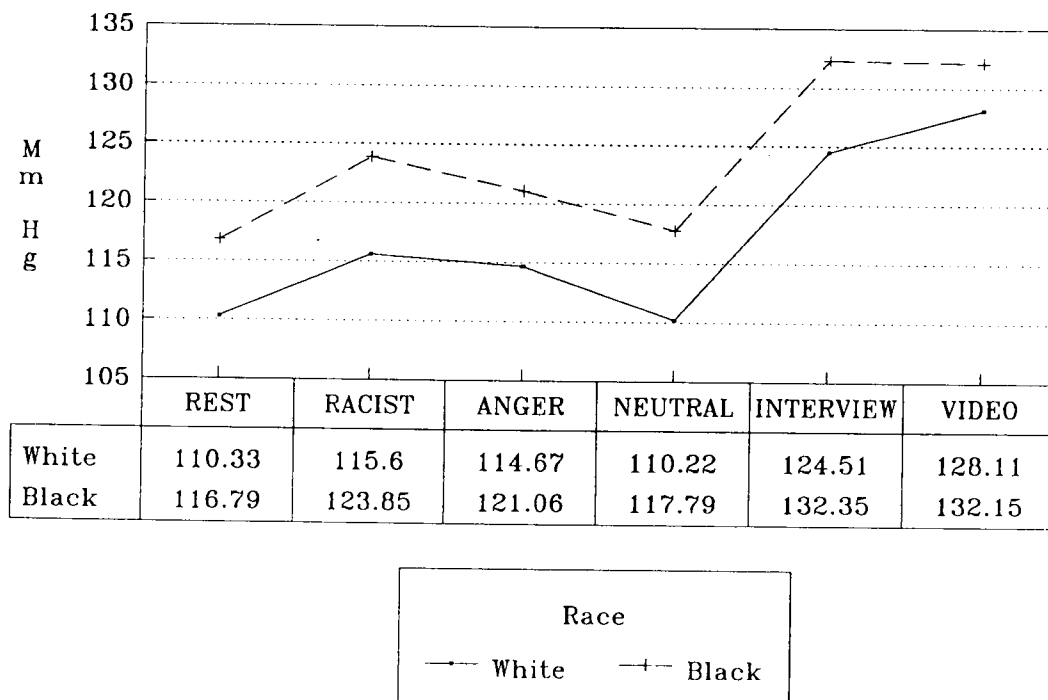


Figure 1. SYSTOLIC PRESSURE BY CONDITIONS

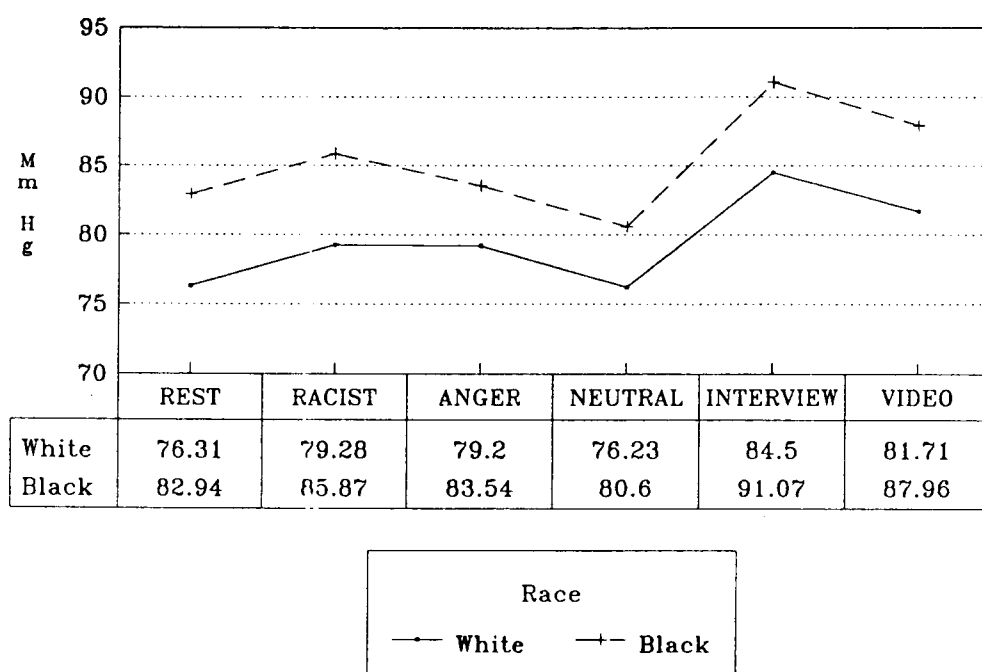


Figure 2. DIASTOLIC PRESSURE BY CONDITIONS

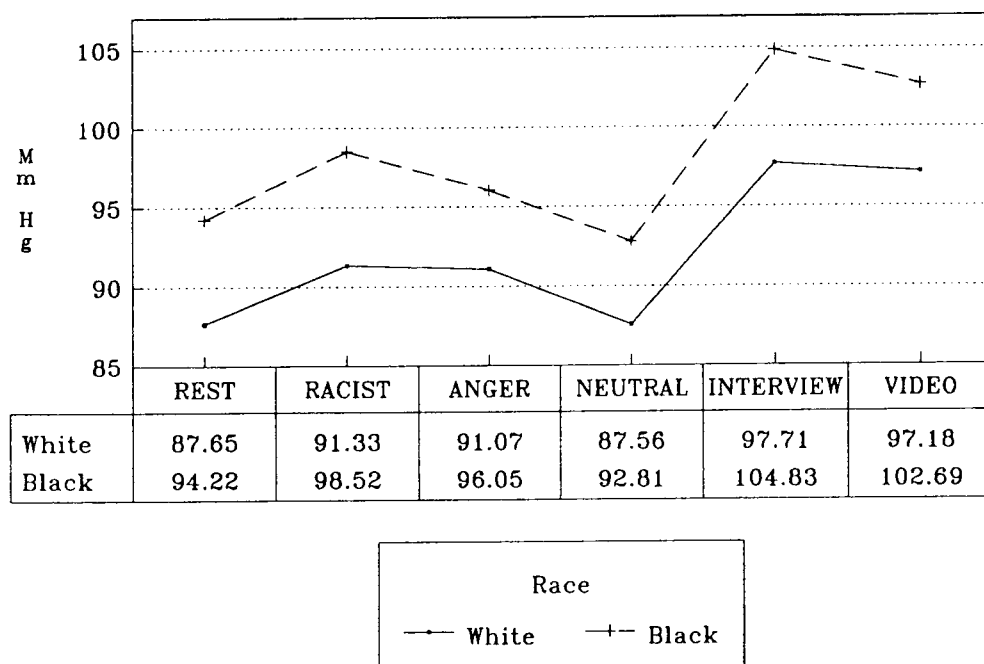


Figure 3. MEAN ARTERIAL PRESSURE BY CONDITIONS

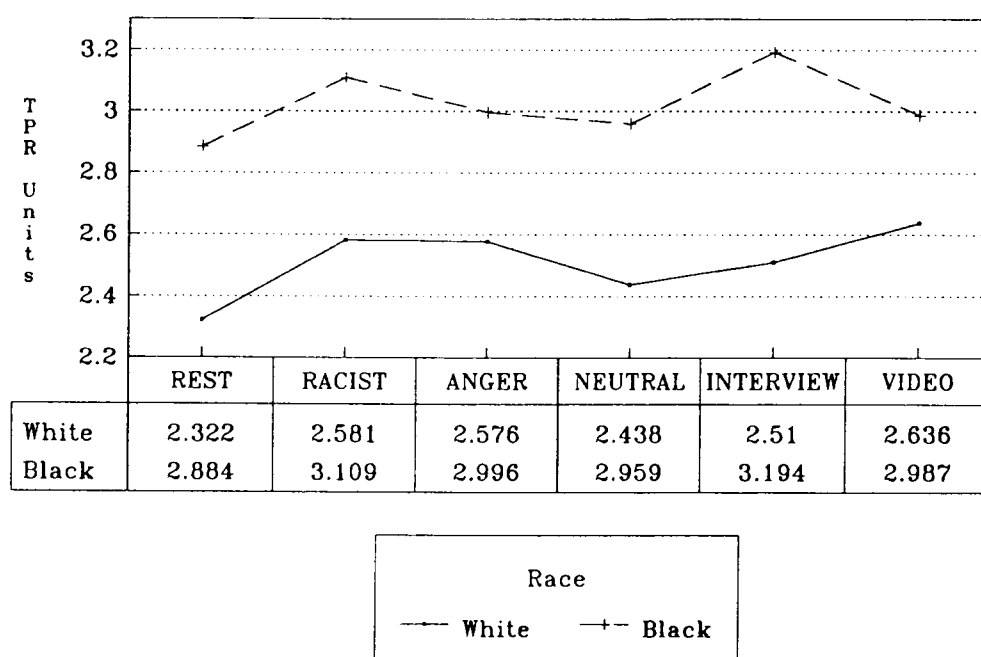


Figure 4. TOTAL PERIPHERAL RESISTANCE BY CONDITIONS

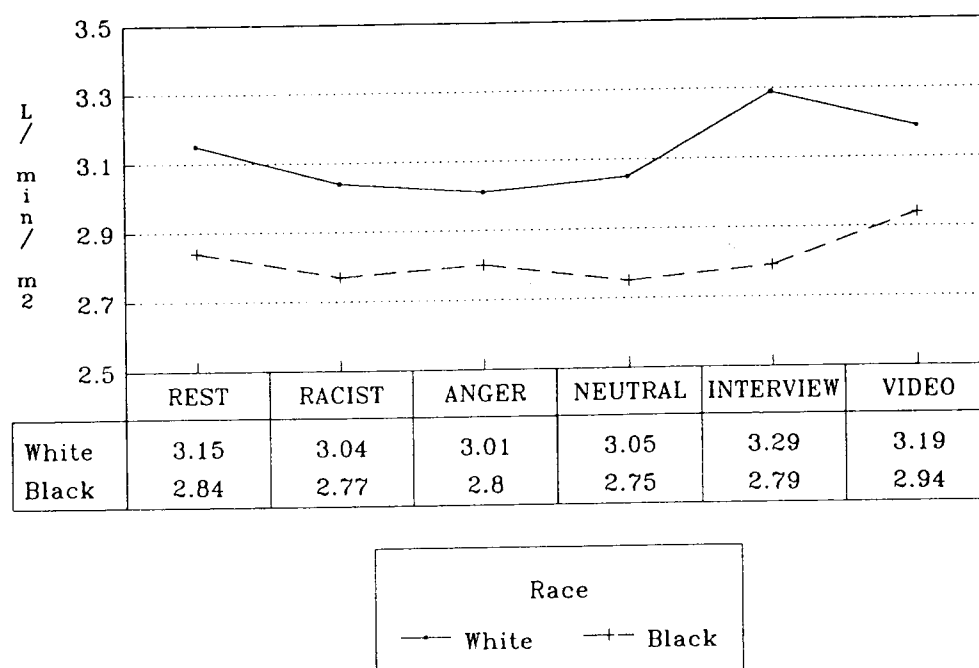


Figure 5. CARDIAC INDEX BY CONDITIONS

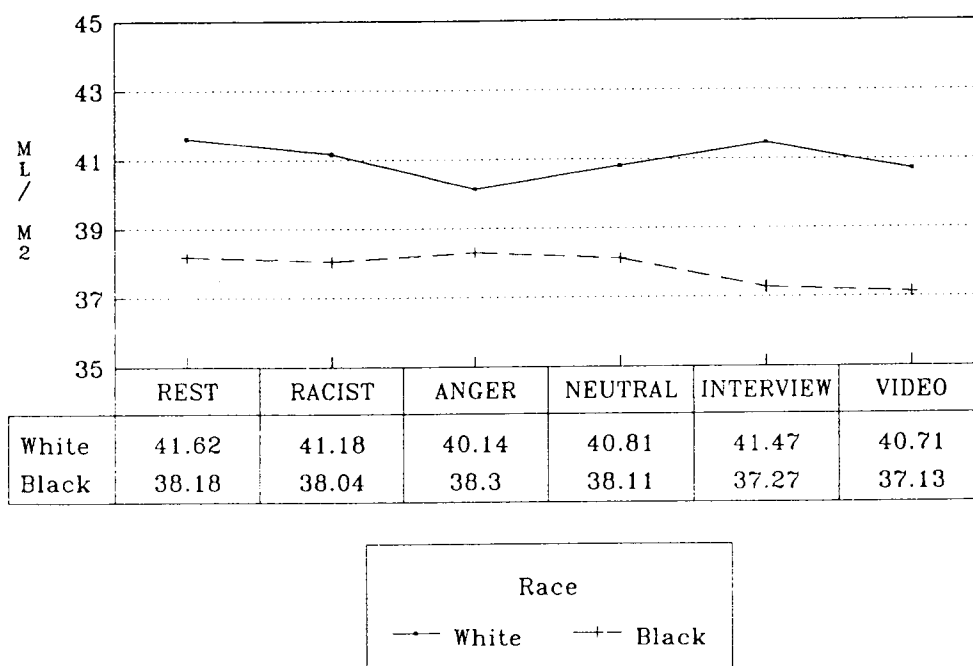


Figure 6. STROKE VOLUME BY CONDITIONS

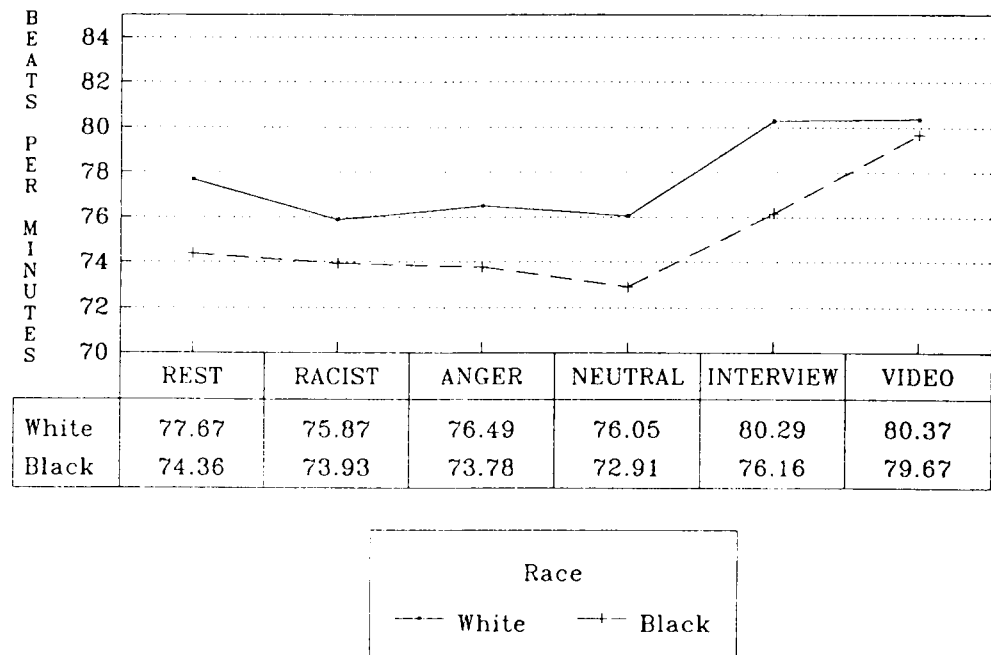


Figure 7. HEART RATE BY CONDITIONS

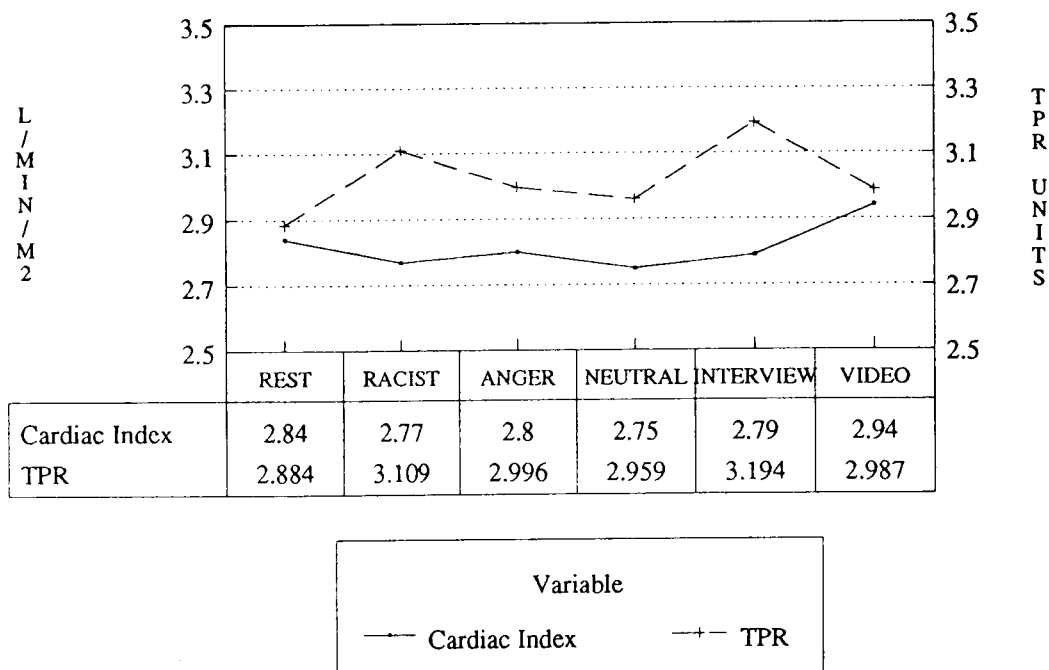


**Figure 8. CARDIAC INDEX AND PERIPHERAL RESISTANCE
Black Subjects**

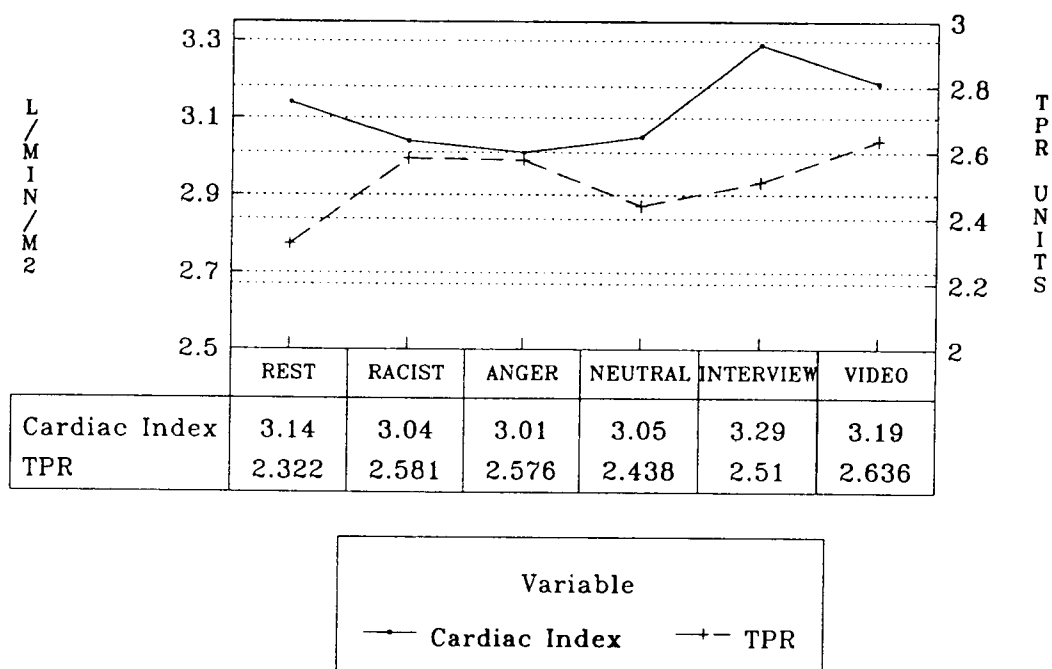


Figure 9. CARDIAC INDEX AND PERIPHERAL RESISTANCE
White subjects

VITA

Cheryl Armstead was born in Alton, Illinois, January 25, 1961. She attended elementary through high school in Alton, Illinois. She graduated from Alton Senior High School, in May 1979. In September 1979, she entered Illinois Wesleyan University in Bloomington, Illinois. In June 1982 she transferred to Saint Louis University and completed a B.S. degree in August of the following year. In September 1983, she began graduate study in experimental psychology with an emphasis in physiological psychology. In 1985, Cheryl was introduced to the field of behavioral medicine. This sparked an interest in hypertension research. In May 1986, she received a MS(R) from Saint Louis University and was accepted into the doctoral program. She worked one year as a prevocational training instructor for developmentally challenged adults at Life Skills Foundation, Saint Louis, Missouri. She also took courses at Saint Louis University on a part time basis.

Deciding to continue her education, Cheryl transferred to University of Tennessee in Knoxville in 1987. While at the University of Tennessee, Cheryl has served as a research assistant with Dr. Kathleen Lawler and an instructor of biological psychology. She was awarded a Doctor of Philosophy degree in May 1991.

The author received a postdoctoral fellowship in the Behavioral Medicine Center at Duke University Medical Center. Her work will involve further investigation of psychological and physiological factors associated with hypertension among Blacks.