Racial and Gender Effects on the Relaxation Response: Implications for the Development of Hypertension

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This study was designed to explore the effect of race and gender on the forehead muscle tension and finger temperature response to biofeedback-assisted relaxation training in individuals with normal blood pressure. Forty-five subjects—18 Black and 27 White, 25 males and 20 females—participated in eight sessions of autogenic relaxation training and thermal biofeedback. Multivariate analysis of variance of the variables measured at baseline (systolic BP, diastolic BP, sodium excretion, anxiety) was significant for gender. Univariate analysis showed males different from females in DBP, Na⁺ excretion, and trait anxiety. Pretest values of muscle tension were similar by gender, but pretest temperatures were lower in males than females. Repeated measures ANOVA for muscle tension showed a significant effect of period. For temperature, a significant effect of period, gender, and gender × period was observed. Males increased temperature more than females. There was no effect of history of hypertension on the relaxation response. Multiple regression performed on change in muscle tension and change in temperature showed that pretest muscle tension predicted change in muscle tension. Four variables contributed to the variance in change in temperature: pretest temperature, sodium excretion, and state and trait anxiety.

Descriptor Key Words: biofeedback; race; gender; relaxation; hypertension.

1We thank Barbara Coen for assistance with the group relaxation sessions. We thank Robert C. Spain, Jr., M.Ed., LPCC for his assistance with the initial preparation of the manuscript. We particularly thank Sadik Khuder, Ph.D., biostatistician, Department of Medicine, for reanalysis and reinterpretation of the data. A preliminary report of this research was presented as a citation poster at the Association for Applied Psychology and Biofeedback in Dallas, 1991.

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Current research is attempting to elucidate the contribution of race and gender factors to the development of hypertension by studying physiological responses in normotensive individuals under resting and reactivity conditions (Anderson, Lane, Maranka, & Williams, 1988). White and Black male and female normotensive college students' cardiovascular responses to mental arithmetic and facial cold, two experimental stressors, were assessed. In these studies, Blacks showed greater increases in blood pressure (BP) and total peripheral resistance to the cold face test, an alpha adrenergic stimulus, than did Whites (Anderson, Lane, Taguchi, Williams, & Houseworth, 1989; Treiber et al., 1990). In another study of normotensive individuals, Black and White subjects of both genders showed no differences in resting BP levels, but Blacks with marginally elevated BP had greater systolic BP responses to cold pressor and to a reaction time task compared to Whites (Light, Obrist, Sherwood, Vance, & Strogatz, 1987).

One-hundred-seventeen normotensive male or female, White or Black students were examined for their response to physiological and psychological stimuli. Gender affected the response to all stressors, with males having a larger BP and a lower heart rate response than females. Blacks had larger BP responses to physical stressors than whites but the same responses to psychological stimuli. Variable baroreceptor sensitivity and/or alpha adrenergic activity may be the underlying mechanism for gender differences in reactivity (McAdoo, Weinberger, Miller, Fineberg, & Grim, 1990).

The interrelationship between BP, salt intake, and psychological stress has also been explored. Norepinephrine, normally released from sympathetic nerve endings during stress, was infused into Black and White normotensive and hypertensive subjects maintained on high- or low-salt diets. Only the hypertensive blacks showed an increased pressor sensitivity on the high-salt diet (Dimsdale, Graham, Ziegler, Zusran, & Berry, 1987). In another study of normotensive White male subjects under an acute stress condition, starting BP levels and parental history of hypertension affected sodium and water excretion. Subjects with borderline BP and a history of hypertension retained sodium and water in comparison to normotensive subjects without such a history (Light, Koepke, Obrist, & Willis, 1983).

Despite an extensive literature on race and gender effects on reactivity, similar research on the relaxation response is sparse. McGrady and Roberts (1992) studied the effects of biofeedback-assisted relaxation combined with diuretic medication in Black women and White male and female hypertensive individuals. No Black male subjects participated. During eight sessions of relaxation therapy and thermal biofeedback, subjects were trained to decrease facial muscle tension and to warm their hands. The White male