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AMONG COLLEGE STUDENTS 

DISSERTATION 

Presented in Partial Fulfillment of the Requirements for 
the Degree Doctor of Philosophy in the Graduate 
School of The Ohio State University 

By 
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The Ohio State University 
1999 

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Consistent evidence for the role of hostility as an independent risk factor for coronary heart disease (CHD) morbidity and mortality has been found in both cross-sectional and prospective research. The present study addressed a number of issues related to the psychosocial vulnerability model of the hostility-CHD relationship, and represents the first known attempt to examine the association of family history of CHD and hostility among young, healthy individuals. To ascertain the interrelationships of cognitive, affective, and behavioral factors of hostility with structural and functional aspects of social support, the study obtained correlations among respective measures of hostility and social support. These measures were administered to samples of healthy, male and female college students in order to discern possible sex differences in hostility and psychosocial vulnerability. To explore developmental and genetic factors in hostility, subjects also completed a family environment measure and were screened for family history of CHD, which has been shown to be an independent risk factor for CHD.

One hundred and twenty-one students (55 women and 66 men) were recruited on the basis of their having at least one biological parent with a history
of CHD. Students whose parents have a history of comorbid chronic illness were excluded, as well as students with a personal history of chronic illness. In addition, an age and sex-matched control group of 125 students (55 women and 70 men) with no family history of CHD (or other chronic illness) was recruited.

For women, correlational analyses indicated a significant negative relationship between affective-experiential hostility and functional social support; results of path analyses found a significant direct effect of affective hostility on functional support in the predicted direction for CHD-negative women. For men, correlational analyses revealed a significant negative relationship between cognitive-experiential hostility and structural social support; results of path analyses found a significant direct effect in the predicted direction for CHD-positive men.

In regard to the association of family history of CHD, ANOVA results showed no significant differences on scales of hostility or family environment between groups based on CHD family history. ANOVA also revealed no significant sex differences on scales of hostility or family environment. However, ANOVA results showed that persons with a positive family history of CHD (particularly men) reported significantly less satisfaction with their social support resources.

In contrast to the psychosocial vulnerability model, and the results of the O'Neil (1997) meta-analysis, a significant positive relationship was found between expressive hostility and functional social support. This association was
significant in correlational analyses for men; results of path analyses found a significant direct effect of expressive hostility on functional support in the positive direction for CHD-negative men and CHD-positive women. In addition, results of linear regression analyses demonstrated a curvilinear relationship between cognitive hostility and quantity of social support for CHD-negative women.

Although the present study is limited by its cross-sectional design and path analysis involving a multiple group analysis of relatively small samples of college undergraduates, the results suggest the need for further research to clarify and refine the psychosocial vulnerability model of the hostility-CHD relationship, as well as the viability of incorporating social support in prospective studies of hostility and CHD. In particular, prospective studies could test whether a communicative expression of anger reduces the risk of CHD by means of improving quality of social support. Data bearing on this question could be of great benefit in enhancing CHD prevention and treatment efforts.
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PUBLICATIONS

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CHAPTER 1

INTRODUCTION

Cardiovascular disorders, including hypertension, stroke, and coronary heart disease (CHD), represent a major public health problem. In the United States, cardiovascular disease is the number one cause of mortality, accounting for nearly 50% of all deaths (Wenger et al., 1995). In addition, the health expenditures for treatment of cardiovascular disease are staggering; the costs related to cardiovascular disease amount to approximately $80 billion annually and represent 14% of all health care expenditures (DiBianco, 1995). Modifiable physical risk factors for CHD include hypertension, obesity, diabetes, high blood cholesterol, lack of exercise, and cigarette smoking. In addition, psychosocial risk factors such as chronic stress, personality characteristics, and deficient social support have also been identified.

Family History of CHD as an Independent Risk Factor

Along with modifiable physical and psychosocial CHD risk factors, there is evidence from epidemiological and genetics research that suggests family
history of CHD is an independent risk factor for CHD. Nora, Lortscher, Spangler, Nora, and Kimberling (1980) conducted a case-control study of 207 CHD patients who had experienced a myocardial infarction (MI) prior to 55 years of age. Among 19 independent variables (including traditional CHD risk factors), the highest risk ratio (10.4) was associated with a family history of CHD in a first-degree relative younger than 55 years of age. Nora et al. (1980) also conducted a heritability analysis of these early-onset cases and found a heritability of .56, even after excluding patients with known monogenic hyperlipidemias. Barrett-Connor and Khaw (1984) conducted a prospective study of 40- to 79-year-old residents of Rancho Bernardo, CA who were free of CHD at time of intake assessment. At 9-year follow-up, results showed that a family history of MI in a first-degree relative was an independent predictor of CHD death for men only. In particular, "significant differences were restricted to younger men; those with a positive family history had a fivefold excess risk of cardiovascular death independent of other risk factors" (p. 1065). Results based on prospective data collected over a thirty-year period in the Framingham Study showed that parental CHD mortality was an independent predictor of CHD for men and women (Myers, Kiely, Cupples, & Kannel, 1990). A 29% increased risk of CHD for persons with a parental history of CHD mortality was found, indicating that family history was comparable to other traditional CHD risk factors.

In a review of genetics studies in Finland, Berg (1983) noted evidence of increased familial aggregation of CHD at younger ages of disease onset. This
finding, especially when taken into consideration with those above, suggests that younger persons (particularly men) whose parent(s) developed CHD at younger ages may be at particular risk for CHD.

**Personality Risk Factors**

The notion that personality traits such as hostility and anger are predispositions for CHD is a centuries-old hypothesis (for a review, see Dembroski, MacDougall, Herd, & Shields, 1983). English physicians such as Heberden (1772), known for his accurate descriptions of angina pectoris symptomatology, and Fothergill (1781), believed anger-related emotions in particular increased one's risk of CHD. The hypothesis of a coronary-prone personality type - that is, a particular cluster of personality traits and behaviors that describes persons who are predisposed to CHD - dates back to the late 19th century (Gatchel, Baum, & Krantz, 1989). The physician Sir William Osler (1892) stated that many coronary patients could be characterized as not being fragile or neurotic, but rather as mentally and physically energetic, achievement-oriented, and driven.

**The Type A Behavior Pattern**

In the 1950’s two cardiologists, Meyer Friedman and Ray Rosenman, observed that many of their CHD patients exhibited a pattern of behaviors they believed to be associated with a disproportionate risk for CHD. Friedman and
Rosenman (1959) denoted this constellation of behaviors as the Type A behavior pattern (TABP), and devised a reliable methodology for its assessment. The definition of TABP was sparked by three major findings. First, research of Friedman and Rosenman and others demonstrated that serum cholesterol levels could be influenced by behavioral variables aside from diet. An example of this research was a 5-month study of tax accountants which found a marked increase in serum cholesterol levels as the April 15 tax deadline approached that was independent of weight, diet, or exercise habits (Friedman, Rosenman, & Carroll, 1958). Second, Friedman and Rosenman observed that a dramatic rise in CHD mortality rates from 1910-1950 was not due to a concurrent increase in risk factors, and also noted contradictory epidemiological data in regard to the association between diet and prevalence and incidence of CHD (Friedman & Rosenman, 1957; Rosenman & Friedman, 1959). Third, they observed that many of their own CHD patients could be characterized by a pattern of behaviors that included tendencies toward ambition, aggression and competition; motor responses such as muscle tension, vigilance, staccato vocal mannerisms, and increased rate of activities; and affective responses of irritability, hostility, and heightened propensity for anger. This constellation of behaviors was then formulated as an action-affect construct Friedman and Rosenman labeled TABP.

Prospective Studies of TABP and CHD

Friedman and Rosenman utilized the results of their prevalence research (Friedman & Rosenman, 1959; Rosenman & Friedman, 1961) as pilot data for
the Western Collaborative Group Study (WCGS, Rosenman et al., 1975), the first prospective effort to examine the relationship between TABP and CHD. In this study, a sample of 3,154 men aged 39-59 who were free of CHD at time of intake were followed for a period of 8.5 years. Subjects were primarily white-collar employees of 10 companies in California and were classified as Type A or Type B based on the Structured Interview (SI, Rosenman, 1978), a standardized interview for assessment of TABP. In addition to TABP ratings derived from the SI, conventional CHD risk factors and CHD symptomatology were assessed at intake and at yearly intervals during the follow-up period. Results at the end of the 8.5 year follow-up period in 1969 showed that subjects assessed as Type A at intake were twice as likely as Type B subjects to display clinical manifestations of CHD (i.e., angina pectoris, MI, or coronary death) (Rosenman et al., 1975). The two-fold risk related to TABP was more or less equal to that associated with other known CHD risk factors. Moreover, the predictive utility of TABP for CHD was independent of the presence of any combination of traditional CHD risk factors. Thus, the results of the WCGS provided the first hard evidence that global TABP confers an independent risk for CHD (Dembroski & Costa, 1987).

However, the results of another large-scale prospective study, the Multiple Risk Factor Intervention Trial (MRFIT, Shekelle, et al., 1985), did not support an association between TABP and CHD. This study evaluated interventions to alter traditional CHD risk factors such as smoking, high blood pressure, and high
cholesterol levels in men who possessed at least one risk factor to determine whether or not the likelihood of developing CHD could be reduced. A subset of MRFIT subjects (N = 3,110) was recruited in an attempt to replicate the results of the WCGS (Rosenman et al., 1975). These subjects were administered the SI (Rosenman, 1978) to assess TABP and were followed for seven years. At follow-up, no association was found between global TABP as defined by the SI and any clinical evidence of CHD (Shekelle et al., 1985).

These contradictory findings led many investigators to question the validity of the global TABP construct as a risk factor for CHD. Subsequent research efforts began to focus instead on the particular components of TABP that may predispose individuals towards CHD (Dembroski & Costa, 1987). Matthews et al. (1977) inspired interest in this line of research when they reported results of their re-analysis of data from the WCGS. Matthews et al. (1977) found that in a subset of WCGS subjects, “the attributes of potential for hostility, explosive and vigorous vocal mannerisms, impatience, irritability, anger, and competitiveness assessed from the tape-recorded structured interview [SI; Rosenman, 1978] of subjects were the strongest components of type A behaviors associated with CHD incidence” (Costa et al., 1987, p. 146).

Hostility

Taking into consideration the long-standing interest in the relationship between hostility and CHD (Diamond, 1982) and the attention given to it by
Friedman and Rosenman in their conceptualization of global TABP, other investigators began using questionnaire measures to evaluate the association of hostility with CHD (Dembroski & Costa, 1987). Williams et al. (1980) explored the relationships between SI ratings of TABP, scores on the Cook-Medley (1954) Hostility Scale (HO) of the MMPI, and CHD in a sample of 424 coronary angiography patients. Results showed that both SI ratings of TABP and HO scores were significantly related to CHD severity. The significance of the association between either one of these variables and CHD was of approximately equal magnitude at a univariate level of analysis. However, of special interest is that the significance of global TABP decreased from p<.01 to p<.05, and that for HO increased from p<.02 to p<.008 at a multivariate level of analysis. In fact, the severity of CHD was greater for non-Type A patients with high HO scores (i.e., greater than 10) as compared to Type A patients with low HO scores (Williams et al., 1980).

Assessment of Hostility

As with the global TABP, Miller et al. (1996) observed that the concept of hostility is not a unitary construct, but rather a broad construct often involving cognitive (e.g., cynicism and mistrust), emotional (e.g., anger), and behavioral (e.g., aggression) factors. Moreover, a related distinction has been made between experiential hostility and expressive hostility (Siegman, 1994).

Experiential hostility primarily refers to subjective factors, notably the affective processes of anger and related emotions and the cognitive
processes comprising hostility (e.g., suspicion and cynicism). In contrast, expressive or behavioral hostility refers to overt verbal or physical aggressiveness, or both (Miller et al., 1996, p. 323).

Thus, measures of hostility can be categorized in terms of whether they assess the behavioral expression of hostility (e.g., SI Anger-Out), the affective experience of hostility (e.g., SI Intensity of Hostility), or the cognitive experience of hostility (e.g., total HO scale).

_Prospective Studies of Hostility and CHD_  
Stronger support for a relationship between hostility (as measured by the HO) and CHD was found in a number of prospective studies. In research on a sample of 1,877 men participating in the Western Electric Study (WES), Shekelle, Gale, Ostfeld, and Paul (1983) found a significant association between HO scores and increased CHD risk over a 10-year follow-up period that was independent of traditional CHD risk factors. In a study of 255 males who had completed the MMPI while in medical school, Barefoot et al. (1983) found that higher HO scores were related to an increased risk for coronary events (i.e., MI or CHD death) over a 25-year follow-up period. As was found in the WES (Shekelle et al., 1983), the association between hostility and CHD was independent of traditional CHD risk factors.
A Quantitative Review of Hostility and CHD

As noted previously, empirical evidence to date on the relationship between the global TABP and CHD has been mixed. Because a number of studies have concluded that hostility confers a risk for CHD above and beyond that for the global TABP (e.g., Williams et al., 1980; Matthews, 1988; Hecker, Chesney, Black, & Frautschi, 1988; Dembroski, MacDougall, Costa, & Grandits, 1989), a recent meta-analysis conducted by Miller et al. (1996) focused solely on hostility and CHD research. In addition to providing an updated review, these authors attempted to answer some of the questions raised by previous meta-analyses (Booth-Kewley & Friedman, 1987; Matthews, 1988) that were conducted to clarify the TABP construct and delineate its more “toxic” components (i.e., hostility and anger). These questions addressed by Miller et al. included (1) determining which method of assessing hostility is most predictive of CHD outcomes, and (2) “whether the magnitude of the association is diminished or increased by controlling for other risk factors, type of study design, or restriction of range of CHD in the study sample” (Miller et al., 1996, p. 324).

Thus, while Miller et al. (1996) employed a similar weighting strategy and delineated between high-risk and population-based studies in accordance with Matthews (1988), the methodology of Miller et al. was different in a number of respects. In particular, both cross-sectional and prospective studies were reviewed, and an attempt was made to determine the association between hostility and CHD independent of other risk factors (e.g., age, sex). More
importantly, Miller et al. categorized studies not only in terms of the hostility measures that were used (i.e., SI, HO, or other self-report scale) but also in terms of the underlying factors the measures purportedly assessed. Therefore, Miller et al. categorized measures in terms of whether they assessed the behavioral expression of hostility (e.g., SI Anger-Out), the affective experience of hostility (e.g., SI Intensity of Hostility), or the cognitive experience of hostility (e.g., total HO scale).

Results of the Miller et al. (1996) review found that hostility is a risk factor for CHD that is: (a) reliable across study designs, (b) independent of other known CHD risk factors, (c) smaller in high-risk studies, and (d) of greatest magnitude when assessed by the SI. In particular, the SI Potential for Hostility component (which appears to assess the affective experience and behavioral expression of hostility) was most predictive of CHD outcomes (e.g., weighted mean $r = .18$ vs. weighted mean $r = .08$ for the HO).

**Mechanisms of Effect Between Hostility and CHD**

Several models have been proposed to account for the relationship between hostility and CHD (for a review, see Smith, 1992). Among the mediating mechanisms proposed to date, the Psychosocial Vulnerability (Smith & Frohm, 1985), and Psychophysiological Reactivity (Williams, Barefoot, & Shekelle, 1985) models have been the most extensively studied. As will be discussed in the following section, these two models are not mutually exclusive; physiological
reactivity may be a function of the extent to which hostility is associated with psychosocial vulnerability (Suls & Wan, 1993). Likewise, the relationship between psychosocial vulnerability and CHD may be a function of hostile persons' heightened physiological reactivity (Smith, 1992).

*Psychophysiological Reactivity Model*

Williams, Barefoot, and Shekelle (1985) postulated that hostility confers a heightened risk for CHD through its relationship to increased cardiovascular and neuroendocrine reactivity. This model suggests that hostile persons manifest greater increases in blood pressure (BP), heart rate (HR), and levels of stress-related hormones in their responses to environmental stressors. Moreover, due to their hostile nature, it is likely that hostile persons feel anger with more frequency and intensity than individuals who are not prone to hostility. In addition, a cynical and mistrusting attitude toward others may lead one to be "on the lookout" for instances of mistreatment. Thus, bouts of anger that occur with increased intensity and frequency along with heightened vigilance in the interpersonal environment are thought to produce exaggerated psychophysiological reactivity; this excessive reactivity in turn leads to the development of CHD.

Qualified support for this hypothesis can be found in Suls and Wan's (1993) quantitative review of the psychophysiological reactivity model (Williams et al., 1985). Using indices of diastolic blood pressure, systolic blood pressure, and heart rate as marker variables of reactivity, results of their meta-analysis
demonstrated that: "[SI] Potential for Hostility-Interpersonal Style was predictive of exaggerated systolic and diastolic blood pressure responses and the Cook-Medley Hostility Inventory was predictive of diastolic blood pressure responses to provocative stressors" (Suls & Wan, 1993, p. 615). However, these authors noted that associations between measures of hostility and blood pressure variables were significant only in response to "harassing (interpersonal) stressors" (Suls & Wan, 1993, p. 621). Moreover, in regard to the distinction made between experiential versus expressive hostility (Siegman, 1994), significant associations with blood pressure were found only for measures that assessed expressive hostility (e.g., SI Potential for Hostility-Interpersonal Style). Therefore, heightened physiological reactivity (i.e., blood pressure, but not heart rate) seems most prominent in persons high in expressive hostility under conditions of interpersonal distress.

These data do not clarify whether expressively hostile persons' heightened physiological reactivity is of pathogenic significance for CHD, although it may depend on whether expressively hostile persons are exposed to significantly greater degrees of interpersonal difficulty as compared to nonhostile persons (Suls & Wan, 1993). The psychosocial vulnerability model (Smith & Frohm, 1985) incorporates the dimension of interpersonal conflict in accounting for the hostility-CHD relationship.
Psychosocial Vulnerability Model

It has been hypothesized that due to their hostile nature, it is likely that hostile persons experience more negative interpersonal relationships (Smith & Frohm, 1985). This taxing psychosocial environment could confer hostile persons with greater risk for CHD, presumably due to heightened cardiovascular reactivity and/or prolonged elevation in cardiovascular markers (Smith, 1992). The impetus for this model began with Smith and Frohm's (1985) research on the construct validity and psychosocial correlates of the HO scale. Based on their finding that the HO scale was strongly associated with indices of trait anger, cynicism, and mistrust of others, these authors postulated that the psychosocial environment of high HO scorers could be characterized by greater numbers of negative life events, more frequent and severe daily hassles, and fewer and less satisfactory social supports. Their hypothesis was supported by results of multiple regression analyses which "indicated that the combination of satisfaction with supports, number of supports, frequency of hassles, and severity of hassles provided the best discrimination of hostility groups" (Smith & Frohm, 1985, p. 515).

Additional support for this hypothesis can be found in several studies that have demonstrated an association between high HO scores and greater interpersonal distress and decreased social support (e.g., Barefoot et al., 1983; Smith, Pope, Sanders, Allred, & O'Keefe, 1988; Miller, Markides, Chiriboga, & Ray, 1995). Moreover, there is substantial empirical evidence of an association
between social support and coronary heart disease (see reviews by Cohen, 1988; Hazuda, 1994; Orth-Gomer, 1994). Cohen and Matthews (1987) suggested that social support is related to CHD via several mechanisms. In particular, they noted that social support can act as a buffer between persons and the pathogenic effects of stress. Furthermore, they argued that support has a main effect on health benefits regardless of one's level of stress. In addition, Cohen and Matthews observed that social networks may reduce the risk of CHD by facilitating adherence to positive health behaviors. Several types of social support measures have been used in CHD research. An overview of these measures is presented in the following section.

Assessment of Social Support

House and Kahn (1985) proposed three classes of social support measures pertaining to social networks, social relationships, and social supports. “Social networks refer to measures deriving from formal network theory, including measures of network size, density, multiplexity, reciprocity, durability, intensity, frequency, dispersion, and homogeneity. Social relationship measures assess the existence, quantity, and type of existing relationships” (Cohen, 1988, p. 270). Social support instruments measure resources received from other persons and include assessments of type (e.g., social companionship, instrumental or informational support), origin, amount, or quality of support.
Another differentiation of measures proposed by Cohen and Wills (1985) is that of structural versus functional support. Structural measures assess the number of and connections among social relationships. Functional measures describe the support resources provided by various social relationships. In their review of support measures, Cohen and Wills (1985) noted four types of social support functions. Esteem support refers to social relationships that provide knowledge that one is valued and accepted. Informational support refers to assistance in clarification of problems and means of coping with them. Social companionship involves engaging in pleasurable activities outside of work with other persons. Instrumental support refers to assistance received from others in the form of financial or material aid and services. In this typology, House and Kahn's (1985) social network and social relationship classes would fall under the structural category, and the social support class would fall under the functional category (Cohen, 1988).

In CHD research, Cohen (1988) observed that the most frequently used measure of social support is a structural indicator of interpersonal relationships that is often referred to as social integration. Social integration items typically include marital status, family and friends, and group membership. The less frequently used functional measures typically include indicators of satisfaction with and perceived availability of support.
A Quantitative Review of the Psychosocial Vulnerability Model

As noted previously, consistent evidence for the role of hostility as an independent risk factor for CHD morbidity and mortality has been found in both cross-sectional and prospective research (Miller et al., 1996). Among the mediating factors proposed to date, psychosocial vulnerability is prominent. Smith (1992) has argued that "the inherently interpersonal nature of hostility would seem to make the importance of social factors obvious" (p. 148). Moreover, results of Suls and Wan's (1993) quantitative review suggested that the CHD pathogenesis of another proposed mediating factor, physiological reactivity, depends on whether hostile persons are exposed to greater interpersonal difficulty as compared to nonhostile persons. Yet, much of the hostility-CHD research to date has not fully examined the psychosocial aspects of this relationship (Smith, 1992).

Therefore, a quantitative review (O'Neil, 1997) was conducted to explicate the psychosocial vulnerability model (Smith & Frohm, 1985) of the hostility-CHD relationship. By examining empirical research on the psychosocial vulnerability model (with the construct of psychosocial vulnerability operationalized as a deficient quantity and quality of social support), the meta-analysis (O'Neil, 1997) addressed two main questions: (1) Is hostility associated with greater psychosocial vulnerability? and (2) Is there a relationship between psychosocial vulnerability and CHD?
Specifically, correlations were obtained between various measures of hostility (e.g., HO scale; Framingham Anger Expression Scales, Haynes, Levine, Scotch, Feinleib, & Kannel, 1978) and social support (e.g., Social Support Questionnaire (SSQ), Sarason, Levine, Basham, & Sarason, 1983; Perceived Social Support Scale (PSSS), Blumenthal et al., 1987b) in order to compute an overall effect size for hostility and the mediating factor of psychosocial vulnerability. Correlations between social support measures and various CHD outcomes (i.e., MI, angina pectoris, coronary death) were also obtained in order to compute an overall effect size for psychosocial vulnerability and CHD.

The O'Neil (1997) quantitative review found the psychosocial vulnerability model (Smith & Frohm, 1985) to be a valid explanation for the relationship between hostility and CHD. Significant effect size estimates were found for the link between hostility and psychosocial vulnerability, and for the link between psychosocial vulnerability and CHD. Among studies of healthy subjects, the strongest associations were seen among measures of cognitive-experiential hostility, structural social support, and CHD outcomes. Among studies of CHD patients, the strongest associations were seen among measures of cognitive-experiential hostility, functional social support, and CHD outcomes.

Although O'Neil's (1997) quantitative review generally supported the validity of the psychosocial vulnerability model (Smith & Frohm, 1985), it also revealed a number of unanswered questions. In particular, the vast majority of studies included in the review utilized the HO scale as a sole measure of hostility, and
assessed either structural or functional support. As the HO scale is considered to be primarily a cognitive-experiential measure of hostility (Smith & Frohm, 1985; Smith, 1992; Miller et al., 1996), little information is available regarding the interrelationships of cognitive, affective, and behavioral factors of hostility, as well as the extent of their associations with structural and functional aspects of social support.

Also, as most studies employed all-male samples or did not report results separately for men and women, sex differences in the hostility-psychosocial vulnerability relationship have not been examined. In this regard, several findings from the O’Neil (1997) meta-analysis are suggestive. First, while expressive hostility was not associated with structural social support among healthy men, expressive hostility was related to a greater quantity of support among healthy women. Second, whereas for healthy men the cognitive experience of hostility (as compared to affective or behavioral factors) had more adverse effects on functional social support, among healthy women a deficient quality of support was more strongly associated with the affective experience of hostility. However, these findings are based on a small number of studies available for the meta-analysis.

Only one study reviewed by O’Neil (1997) compared the hostility and psychosocial vulnerability of persons with and without CHD (Spicer, Jackson, & Scragg, 1993), and none of the studies assessed family history of CHD. Thus, the extent to which hostility and deficient social support are associated with
family history of CHD remains unknown. Given the importance of family history of CHD as an independent risk factor for CHD, particularly among younger persons whose first-degree relatives developed disease prior to 55 years of age (Nora et al., 1980; Berg, 1983; Barrett-Connor & Khaw, 1984), research on hostility and psychosocial vulnerability as related to family history of CHD is an important next step in this area of research.

**Developmental Factors in Hostility**

Two main factors have been postulated in regard to the determinants of hostility: family environment and genetic influences. A discussion of these factors is presented in the following sections.

**Family Environment**

In addition to further research on hostility and psychosocial vulnerability, exploration of the developmental aspects of hostility could also help in CHD prevention and treatment efforts. Several studies have looked at the relationship between family environment and hostility. Smith et al. (1988) noted that male and female college students’ high HO scores were related to reports of conflict and low cohesion on a family environment measure. Houston and Vavak (1991) observed that college undergraduates with high HO scores described their parents’ behavior as being more interfering and punitive, and reflecting less genuine acceptance. However, these studies only assessed students’ retrospective perceptions of the family environment, and thus results may be
biased. In contrast, Matthews et al. (1992) administered the SI and an MMPI-derived hostility measure to both children and their parents; results displayed minimal familial aggregation of TABP or hostility. Again, these studies have relied primarily on the HO scale to assess hostility. Therefore, less is known about the effects of family environment on affective or behavioral components of hostility.

Genetic Influences

A number of physiological CHD risk factors have been shown to be heritable including blood pressure, serum cholesterol, and body mass index (Berg, 1983; Austin, 1993; Brenn, 1994). Family history of CHD is also considered to be a heritable risk factor (Nora et al., 1980; Berg, 1983). Similarly, evidence from behavioral genetics research suggests that there are heritable components of hostility factors, as well. Several studies that compared monozygotic (MZ) and dizygotic (DZ) twins have found a significant genetic influence on HO scores (Carmelli, Swan, & Rosenman, 1990; Smith, McGonigle, Turner, Ford, & Slattery, 1991), scores on a measure of trait anger (Cates, Houston, Vavak, Crawford, & Uttley, 1992), SI Potential for Hostility ratings (Matthews, Rosenman, Dembroski, Harris, & MacDougall, 1984), and scores on measures of verbal and behavioral aggression (Coccaro, Bergeman, Kavoussi, & Seroczynski, 1997). Because hostility has been linked to other genetic markers of CHD including blood pressure reactivity (Suls & Wan, 1993), and body mass index (Houston & Vavak, 1991), a related question is whether hostility is
associated with a family history of CHD. As noted previously, no published studies to date have examined this question. Taken into consideration with the aforementioned results of genetics research, such a relationship would provide converging evidence that the link between hostility and CHD may reflect shared genetic variance (Suls & Sanders, 1989).

**Present Study**

The present study attempts to address the previously discussed issues related to the psychosocial vulnerability model (Smith & Frohm, 1985) of the hostility-CHD relationship. The O'Neil (1997) meta-analysis of this model demonstrated that little is known about the interrelationships of cognitive, affective, and behavioral factors of hostility, as well as the extent of their associations with structural and functional aspects of social support. Furthermore, O'Neil's review found scant information about possible sex differences in the hostility-psychosocial vulnerability relationship. Hence, the present study evaluated cognitive, affective, and expressive measures of hostility, and structural and functional social support measures in samples of healthy men and women.

In addition, subjects completed a family environment measure (Family Environment Scale (FES), Moos, Insel, & Humphrey, 1974) and were screened for family history of CHD in order to explore developmental and genetic factors in the expression of hostility. Thus, the present study represents the first known
attempt to examine the association of family history of CHD and hostility among young, healthy individuals.

The decision to recruit subjects for the present study from a college student population was based on a number of theoretical, methodological, and practical considerations. First, as noted previously, there is evidence that persons with a family history of CHD in a first-degree relative are at increased risk for CHD, especially if there was an early onset of disease (i.e., prior to 55 years of age) in the relative (Nora et al., 1980; Berg, 1983). College students' parents are likely to be middle-aged, thus placing students with a positive parental history of CHD at particular risk. Hence, CHD prevention efforts should be targeted towards these students; such efforts could be enhanced by learning more about how psychosocial risk factors cluster in this population. Second, college students share relatively similar lifestyles, and can be considered relatively homogeneous in terms of intellectual functioning. Third, it is possible to sample equal numbers of men and women in this population.

The following hypotheses stem from the findings of the O'Neil (1997) meta-analysis and were tested via correlational analysis and univariate analysis of variance (ANOVA):

**Structural Social Support**

1. Among women and men, structural social support will be more negatively correlated with the cognitive experience of hostility, as compared to the affective experience or the behavioral expression of hostility;
2. Among women, expressive hostility will be positively correlated with structural social support;
3. Among men, expressive hostility will be unrelated to structural social support;
4. Among men, the strongest correlation in the hostility-psychosocial vulnerability relationship will be that for cognitive-experiential hostility and structural social support;

Functional Social Support

5. Among women, functional social support will be more negatively correlated with affective-experiential hostility, as opposed to cognitive-experiential hostility or expressive hostility;
6. Among men, functional social support will be more negatively correlated with cognitive-experiential hostility, as opposed to affective-experiential hostility or expressive hostility;
7. Among women, the strongest correlation in the hostility-psychosocial vulnerability relationship will be that for affective-experiential hostility and functional social support;

Family History of CHD

8. Persons with a family history of CHD will exhibit higher scores on measures of hostility as compared to persons without a family history of CHD;
9. Persons with a family history of CHD will exhibit lower scores on measures of social support as compared to persons without a family history of CHD;
10. Persons with a family history of CHD will report less family support (as measured by their responses on the FES Cohesion subscale), as compared to persons without a family history of CHD; and

11. Persons with a family history of CHD will report more family conflict (as measured by their responses on the FES Conflict subscale), as compared to persons without a family history of CHD.

In addition, path analysis was conducted to test the validity of the psychosocial vulnerability model (Smith & Frohm, 1985) of the hostility-CHD relationship. As well as family history of CHD, sex, hostility, and social support variables, the basic model incorporated the demographic variables of family size, week of the academic year, and living status (i.e., whether the subject lived with their parents at the time of data collection) as control variables. Living status was utilized as a control variable because it was thought that students who were living at home with their parents would report greater levels of structural and functional social support as compared to students who were geographically separated from their families and hometowns. The week of the academic year was incorporated as a control variable because students who participated in the study later in the year were likely to have more established structural and functional support resources. Family size was utilized as a control variable because it was believed that students from larger families would report greater quantities of social support.
CHAPTER 2

METHOD

Subjects

Subjects were female and male college undergraduates at the Ohio State University. Students were enrolled in Introductory Psychology and received partial course credit for their participation in the study. One hundred and twenty-one students (55 women and 66 men) were recruited on the basis of their having at least one biological parent with a history of CHD (i.e., as manifested by MI, coronary angioplasty, coronary artery bypass graft (CABG) surgery, or coronary death). Students whose parents have a history of comorbid chronic illness (e.g., cancer, diabetes, arthritis) were excluded, as well as students with a personal history of chronic illness (i.e., CHD, cancer, diabetes). In addition, an age and sex-matched control group of 125 students (55 women and 70 men) with no family history of CHD (or other chronic illness) was recruited.
In accordance with meta-analyses by Miller et al. (1996), and Suls and Wan (1993), measures of hostility were categorized in terms of whether they assessed cognitive, affective, or behavioral factors of hostility in order to determine whether experiential or expressive hostility (Siegman, 1994) is more predictive of psychosocial vulnerability. Classification of hostility measures was based on previous evaluations of construct validity (Smith & Frohm, 1985; Smith, 1992), Miller et al.'s (1996) meta-analysis of hostility and health, and inspection of item content.

*Cook-Medley Hostility (HO) Scale* (Cook & Medley, 1954). This 50-item scale was derived from the 550 items that comprised the full-scale MMPI in 1954. Cook and Medley selected the 50 items that comprise the HO scale on the basis of their differentiating between teachers with good and poor student-teacher rapport. Sample items on the HO scale include: "I would certainly enjoy beating a crook at his own game," 'When someone does me a wrong I feel I should pay him back if I can, just for the principle of the thing,' 'I have often met people who were supposed to be expert who were no better than l'" (Cook & Medley, 1954, p. 417). Internal consistency reliability for the HO scale is .86.

Based upon content analysis of the items endorsed by individuals who score high on this scale, Cook and Medley (1954) conclude that the hostile person (as defined by a high HO score) "... is one who has little confidence in his fellow
man. He sees people as dishonest, unsocial, immoral, ugly and mean, and
believes that they should be made to suffer for their sins. [Their] Hostility
amounts to chronic hate and anger (Cook & Medley, 1954, p. 418).” Thus, the
HO appears to be a measure of the cognitive experience of hostility (Smith &
Frohm, 1985; Smith, 1992; Miller et al., 1996).

State-Trait Anger Scale (STAS, Spielberger, Jacobs, Russell, & Crane,
1983). This measure consists of two 10-item subscales developed to assess the
magnitude of the emotional state of anger (S-Anger), and individual differences
in anger propensity as a personality trait (T-Anger). A rational-empirical
technique was utilized in constructing the STAS, similar to that of the State-Trait
Anxiety Inventory (Spielberger, 1983). Spielberger et al. (1983) conceptualized
T-Anger in terms of the predisposition to experience anger, which would be
associated with the frequency and intensity of experiencing S-Anger over time.
Thus, persons scoring high in T-Anger consider more situations to be anger-
provoking, and respond to these situations with a greater intensity of elevations
in S-Anger. This conceptualization is consistent with Miller et al.’s (1996)
categorization of the T-Anger scale as a measure of the affective experience of
hostility.

Subjects are instructed to respond to items on the T-Anger scale (e.g., “I am
a hotheaded person;” “It makes me furious when I am criticized in front of
others”) by rating “themselves according to ‘how you generally feel’ on the
following four-point scale: (1) Almost never; (2) Sometimes; (3) Often; (4) Almost
Always" (Spielberger et al., 1983, p. 170). Subjects are instructed to respond to items on the S-Anger scale (e.g., "I am furious;" "I feel angry") by rating "the intensity of their feelings 'right now' ... on the following four-point scale: (1) Not at all; (2) Somewhat; (3) Moderately so; (4) Very much so" (p. 170).

To assess the psychometric properties of the STAS, Spielberger et al. (1983) administered the measure to large samples of high school and college students, military recruits, and working adults. Internal consistency reliabilities for the S-Anger scale ranged from .88 to .97. Internal consistency reliabilities for the T-Anger scale ranged from .81 to .96.

Anger Expression (AX) Scale (Spielberger, Johnson, Russell, Crane, Jacobs, & Worden, 1985). Spielberger et al. devised this scale in order to distinguish between the affective experience of anger (i.e., as either a transient emotional state or an enduring personality trait) and the behavioral expression of anger. A rational-empirical approach was again used to construct the AX scale, which includes newly-written items as well as items selected from other measures (e.g., Zelin et al.'s (1972) Anger Self-Report Scale). After an initial pool of 33 items was administered to a large sample of high school students, 20 items were selected on the basis of a factor analysis yielding a three-factor solution. Thus, the total AX scale consists of three subscales: Anger-In (8 items, e.g., "I boil inside, but I don't show it"), Anger-Out (8 items, e.g., "I strike out at whatever infuriates me"), and Anger-Control (4 items, e.g., "I keep my cool"). Alpha reliability coefficients range from .73 to .84.
Subjects rate the AX scale items via the same four-point scale as that of the T-Anger subscale of the STAS (Spielberger et al., 1983). However, “rather than requiring subjects to respond to the individual AX items according to how they generally feel, the instructions directed them to indicate how often they behaved in a particular manner .... when they feel ‘angry’ or ‘furious’” (Spielberger et al., 1985, p. 15). These instructions are consistent with Miller et al.’s (1996) categorization of the AX scale as a measure of the behavioral expression of hostility. The Anger-Out and Anger-In scores are utilized to compute the Anger Expression Style (AES, Engebretson & Stoney, 1995) score described in the following section.

AES (Engebretson & Stoney, 1995). To compute AES scores, Anger-Out and Anger-In scores are initially standardized to equate their influence on the derived AES score. After they are standardized, Anger-In scores are subtracted from Anger-Out scores. Resulting scores that are positive indicate a greater tendency toward behavioral expression as compared to behavioral nonexpression when angry; resulting scores that are negative suggest a greater tendency toward behavioral nonexpression relative to behavioral expression when angry. Scores that hover around zero “indicate that either expressive or nonexpressive behaviors may be displayed when the individual is angry. This subtraction approach allows differentiation of individuals according to relative use of anger expression and anger nonexpression behaviors” (Engebretson & Stoney, 1995, p. 286).
Measures of Social Support

In accordance with the work of Cohen and his colleagues (Cohen & Wills, 1985; Cohen, 1988), measures of social support were categorized in terms of whether they assessed structural or functional aspects of support. Structural measures assess the number of and connections among social relationships. Functional measures describe the support resources provided by various social relationships. Classification of support measures was based on Cohen and Wills' (1985) review, and inspection of item content.

Social Support Questionnaire (SSQ, Sarason et al., 1983). The SSQ consists of 27 items that assess the respondent’s perceived number of social supports and their satisfaction with these sources of support. Sample items include: “Whom can you count on to be dependable when you need help?,” “Who do you feel really appreciates you as a person?” (Sarason et al., 1983, p. 129). Subjects are instructed to respond to each item in two parts: “For the first part, list all the people you know, excluding yourself, whom you can count on for help or support in the manner described .... For the second part, circle how satisfied you are [on a scale of 1 (“very dissatisfied”) to 6 (“very satisfied”)] with the overall support you have” (p. 130).

The SSQ yields two subscale scores; the number (SSQ-N) score is the total number of persons listed as supports, and the satisfaction (SSQ-S) score is the sum total of satisfaction ratings. Based on a test administration to a large sample of college undergraduates, Sarason et al. (1983) reported alpha reliabilities of
.97 and .94, and 4-week test-retest reliabilities of .90 and .83 for the SSQ-N and SSQ-S, respectively.

Subsequent to this test administration, Sarason et al. (1983) conducted a factor analysis that yielded a single factor solution for each subscale. The moderate correlation of .34 between the two subscales provides further support for conceptualizing the SSQ as a measure of both structural support (SSQ-N) and functional support (SSQ-S) (Cohen & Wills, 1985).

Interpersonal Support Evaluation List (ISEL, Cohen & Hoberman, 1983). The ISEL is comprised of 48 items that assess the perceived availability of social support resources. The construction of items was theoretically-based in order to assess the domain of social support functions that college students typically experience. To control for desirability, half of the items are positive statements regarding social relationships (e.g., “I know someone who would lend me their notes if I missed class”), and half are negative statements (e.g., “There isn’t anyone at school or in town with whom I feel perfectly comfortable talking about my career goals”). Subjects are instructed to indicate whether each item is “probably true” or “probably false.”

The 48 items are divided into four 12-item subscales that measure the perceived availability of four distinct functions of social support, and yield an overall index of support:

The ‘tangible’ subscale is intended to measure perceived availability of material aid; the ‘appraisal’ subscale, the perceived availability of
someone to talk to about one's problems; the 'self-esteem' scale, the perceived availability of a positive comparison when comparing one's self to others; and the 'belonging' scale, the perceived availability of people one can do things with (Cohen & Hoberman, 1983, p. 104).

Thus, the ISEL can be conceptualized as a functional measure of social support (Cohen & Wills, 1985).

Based on a test administration to a sample of college undergraduates, Cohen and Hoberman (1983) reported internal consistency reliabilities for the four ISEL subscales ranging from .60 (Self-esteem scale) to .77 (Appraisal scale). Internal consistency reliability for the full-scale ISEL was .77.

Family Environment Scale (FES, Moos, Insel, & Humphrey, 1974). "The FES assesses the social climates of all types of families. It focuses on the measurement and description of the interpersonal relationships among family members, on the directions of personal growth which are emphasized in the family, and on the basic organizational structure of the family" (p. 3). Respondents are requested to answer yes or no to ninety statements about the nature of their family environment. The full FES consists of the following 10 subscales: Cohesion, Expressiveness, Conflict, Independence, Achievement Orientation, Intellectual-Cultural Orientation, Active Recreational Orientation, Moral-Religious Emphasis, Organization, and Control. Subscale internal consistencies calculated with the Kuder-Richardson Formula 20 range from .64 (Independence) to .79 (Moral Religious Emphasis). Average item-to-subscale
correlations range from .45 (Independence) to .58 (Cohesion). Test-retest reliabilities (measured over an 8-week interval) range from .68 (Independence) to .86 (Cohesion). The FES takes approximately 10 minutes to complete. For the purposes of the present study, only the FES Cohesion and Conflict subscales will be utilized.

Medical History Questionnaire (adapted from Stoney, 1997). This measure requests respondents to answer yes or no to items regarding their own as well as their parents’ history of chronic physical illness, including CHD, cancer, diabetes, and arthritis.

Procedure

Human subjects approval for the study was received from the Human Subjects Review Committee of the Ohio State University. Subjects were asked to complete three hostility measures (the HO, STAS, and AX scales), three social support measures (the SSQ, ISEL, and FES scales), and a medical history questionnaire during a 60-minute test session at the University. Prior to administering the measures, the experimenter (the author) read an introduction to the subjects detailing the voluntary nature of their participation and the steps taken to ensure their anonymity and confidentiality. The experimenter tested all participants in groups of approximately 30 subjects.
Data Analysis

Collected data were analyzed with the Statistical Package for Social Sciences (SPSS 8.0 for Windows). To test hypotheses #1-7 (e.g., among women, the strongest correlation in the hostility-psychosocial vulnerability relationship will be that for affective-experiential hostility and functional social support), two matrices (one for women and one for men) of Pearson product moment correlations were calculated between hostility and support scales.

To test hypothesis #8 (i.e., persons with a family history of CHD will exhibit higher scores on measures of hostility as compared to persons without a family history of CHD), a 2 (Family History of CHD vs. No Family History of CHD) x 2 (Sex of Subject) ANOVA was conducted for each of the three hostility measures (with the respective hostility measure as the dependent variable).

To test hypothesis #9 (i.e., persons with a family history of CHD will exhibit lower scores on measures of social support as compared to persons without a family history of CHD), a 2 (Family History of CHD vs. No Family History of CHD) x 2 (Sex of Subject) ANOVA was conducted for each of the three support scales (with the respective support scale as the dependent variable).

To test hypothesis #10 (i.e., persons with a family history of CHD will report less family support as measured by their responses on the FES Cohesion subscale), a 2 (Family History of CHD vs. No Family History of CHD) x 2 (Sex of Subject) ANOVA was conducted with the FES Cohesion subscale as the dependent variable.
To test hypothesis #11 (i.e., persons with a family history of CHD will report more family conflict as measured by their responses on the FES Conflict subscale), a 2 (Family History of CHD vs. No Family History of CHD) x 2 (Sex of Subject) ANOVA was conducted with the FES Conflict subscale as the dependent variable.

Finally, path analysis was conducted to test the validity of the psychosocial vulnerability model. In addition to family history of CHD, sex, hostility, and social support variables, the basic model was supplemented with the demographic variables of family size, week of the academic year, and living status (i.e., whether the subject lived with their parents at the time of data collection) as control variables. All analyses were performed using the Amos (Arbuckle, 1997) computer program for structural equation modeling.

Path Analysis

Path analysis is a statistical procedure that is used to test theoretical models that describe causal relationships among observed variables. The technique assesses the extent to which a particular model accurately accounts for observed relationships in the sample data (i.e., how well the model fits the data). While it is also possible to test models that specify relationships among latent or unobserved variables (e.g., as in confirmatory factor analysis), path analysis is a "technique for when there is only a single observed measure of each theoretical variable and the researcher has a priori hypotheses about causal relations
among these variables” (Kline, 1998, p. 51). In addition, path models are said to be either nonrecursive if they predict reciprocal causation between two or more variables, or recursive if causal influences are unidirectional (Hatcher, 1994). The present discussion will focus on recursive path models that solely depict unidirectional relationships among manifest or directly observed variables.

There are two main types of variables in a recursive path model. Exogenous variables are antecedent constructs (the causes of which are unknown) that are predicted to precede and exert a causal effect on endogenous variables. An endogenous variable is a consequent variable whose variance is hypothesized to be causally influenced by one or more exogenous variables in the model. In the convention of path analysis, straight, single-headed arrows are used to depict direct effects, unidirectional causal paths originating from exogenous variables and extending to endogenous variables. Statistical estimates of direct effects are termed path coefficients, which are interpreted in the same manner as regression coefficients in multiple regression. That is, path coefficients control for correlations among the predicted causal influences (i.e., exogenous variables) of an endogenous variable. Such correlations between exogenous variables are represented by curved, double-headed arrows. As the causes of exogenous variables are unknown, these arrows do not specify any presumed causal relationships between exogenous variables but rather denote only that they are expected to covary (Hatcher, 1994; Kline, 1998).
Each endogenous variable in a path model has its own residual term, or error term. Theoretically, an error term represents all unknown causes of an endogenous variable that are not explicitly stated in the model. Because the nature and number of these causes is not represented in the model, error terms can also be conceived of in terms of unmeasured exogenous variables (Kline, 1998). In the path analysis literature, boxes are used to signify exogenous and endogenous variables, with error terms being represented by ellipses. Again, a straight, single-headed arrow is used to depict the effect of an error term (i.e., the combined influences of all unmeasured effects) on an endogenous variable.

**Steps in Path Analysis**

Kline (1998) outlines the following steps for conducting a path analysis:

1. **Specify the path model.** The hypothesized causal relationships among observed variables are represented in the form of a path diagram.

2. **Determine if the path model is identified.** A path model is identified if it is theoretically possible to compute a unique estimate for each model parameter. For a model to be identified, the number of model parameters (i.e., estimated statistical effects) cannot be greater than the number of observations (i.e., the number of variances and covariances among observed variables). An alternative way to determine whether a path model is identified is to view the model in terms of a system of functional equations. Thus, a model is represented by several equations that specify the causal influences on each endogenous variable and includes a number of unknown parameters.
to be estimated (e.g., variances, covariances, and path coefficients). A path model is said to be just-identified if the number of equations (i.e., observations) is equal to the number of unknown parameters. While just-identified models do yield a unique set of parameter estimates, they do not allow for any tests of goodness of fit. This is because by definition, just-identified models always fit the sample data perfectly. In contrast, a model is said to be overidentified if the number of equations is greater than the number of unknown parameters. Overidentified models have the advantage of not only providing a unique set of parameter estimates, they also allow for tests of goodness of fit.

3. Select measures of the variables depicted in the path model and collect the data.

4. Analyze the path model. Utilize a model-fitting computer program to yield estimates of model parameters based on sample data.

5. Evaluate the fit of the model. Determine how well a particular model accounts for observed relationships in the sample data.

6. Respecify the model and evaluate its fit to the data. Path analysis is typically an iterative process; rarely does an initial model fit the data extremely well. MacCallum (1986) strongly encourages theoretically-based, as opposed to empirically-based (i.e., data-driven), respecification of models.
Evaluating the Fit of a Path Model

There are numerous fit indices described in the path analysis literature, the most basic of which is the *generalized likelihood ratio* (Kline, 1998). The generalized likelihood ratio is interpreted as a Pearson chi-square ($X^2$) statistic with degrees of freedom being equal to the difference between the number of observations and parameters. As noted previously, a just-identified path model has equal numbers of observations and parameters, and always fits the sample data perfectly. Thus, its $X^2$ statistic is equal to zero with no degrees of freedom. For an overidentified model, the number of degrees of freedom is always positive with the $X^2$ statistic interpreted as a significance test of the difference in goodness of fit between an overidentified model and a just-identified model. A nonsignificant $X^2$ value (the desired result) thus indicates no significant difference in goodness of fit between the two models.

Several problems with the use of hypothesis testing in path analysis have been noted. In particular, the procedure is very sensitive to sample size with significant results being more likely with larger samples (Arbuckle, 1997; Kline, 1998). Moreover, researchers have questioned the overall utility of attempting to prove the null hypothesis of perfect fit. "Our opinion... is that this null hypothesis [of perfect fit] is implausible and that it does not help much to know whether or not the statistical test has been able to detect that it is false" (Browne & Mels, 1992, p.78). To control for the sensitivity of the $X^2$ statistic to sample size, a number of writers have suggested the use of a *relative* $X^2$ statistic ($X^2/df$) which
results in a lower value. While a ratio of one is the ideal result, various researchers have suggested using ratios ranging between 2 to 1 and 5 to 1 to indicate an acceptable fit of the model to the sample data (Arbuckle, 1997).

Due to the sensitivity of the $\chi^2$ statistic to sample size and questions regarding its validity in applied settings (Joreskog & Sorbom, 1989), many researchers suggest the use of alternative goodness of fit indices to supplement chi-square hypothesis testing (Arbuckle, 1997; Kline, 1998). The Joreskog-Sorbom Goodness of Fit Index (GFI, Joreskog & Sorbom, 1996) “is analogous to a squared multiple correlation in that it indicates the proportion of the observed covariances explained by the model-implied covariances” (Kline, 1998, p. 128). Values of the GFI range from 0 to 1, with values over .9 indicating an acceptable fit of the model to the sample data. While the GFI reflects the absolute proportion of variance explained by a model, two other fit indices, the Bentler-Bonnet Normed Fit Index (NFI, Bentler & Bonnet, 1980), and the Bentler Comparative Fit Index (CFI, Bentler, 1990) indicate the percentage in improvement of the fit of the proposed model relative to a null model in which the observed variables are assumed to be uncorrelated. Thus, an NFI value of .80 indicates that the relative fit of the proposed model is 80% better than that of the null model. The CFI is interpreted in the same manner as the NFI (i.e., they are both indices of incremental fit relative to a null model) but is less likely to underestimate the goodness of fit with small samples. Again, values of the NFI and CFI range from 0 to 1, with values over .9 indicating an acceptable fit of the
model to the sample data (Arbuckle, 1997; Kline, 1998). Kline (1998) notes that there is no single criterion to determine what constitutes a good model fit. Because each of the fit indices reflects a different dimension of fit, a given model may yield a range of fit index values indicating a better fit in some aspects relative to others.

Path Analysis in the Present Study

In order to observe potential interaction effects, the sample in the present study was divided into four groups based on CHD family history and sex. Thus, the first objective was to ascertain whether estimates of model parameters varied across the four groups by conducting a multiple group path analysis (Arbuckle, 1997; Kline, 1998). Specifically, cross-group equality constraints were placed on the path coefficients (i.e., values for path coefficients were constrained to be equal across the four groups), and a chi-square test comparing the constrained model to an unconstrained model (i.e., with path coefficients freely estimated) was conducted. A significant difference in relative fit between the two models would indicate that the direct effects of exogenous variables were different among the groups (Kline, 1998), and allow for a series of four pairwise comparisons (again with cross-group equality constraints and a chi-square test comparing the constrained model to an unconstrained model) to be completed to determine exactly where group differences existed.
CHAPTER 3

RESULTS

Demographic Variables

Preliminary analyses were conducted to evaluate baseline differences between the two CHD family history groups. Chi-square tests were used for categorical demographic variables; univariate t-tests were conducted for continuous demographic variables. There was no significant difference in age between the two groups (mean age in positive family history group = 19.41; mean age in negative family history group = 19.28). No significant differences in race were found between the two groups. Over 83% of the CHD-positive group and over 74% of the CHD-negative group were Caucasians. Nearly 6% of both groups were African-Americans. Percentages for all racial groups are reported in Table 1.

There was no significant difference in family size between the two groups. Mean number of family members (including the subject) for the CHD-positive family history group was 4.46; mean family size for the CHD-negative family history group was 4.65. No significant difference in living status was found between the two groups. Just over 82% of the CHD-positive group were living
away from their parents at the time of data collection, as compared to nearly 81% of the CHD negative group.

Relationship Between Hostility and Psychosocial Vulnerability

Pearson product moment correlations were calculated between hostility and support scales for men and for women. Correlation matrices are presented in Tables 2 (women) and 3 (men). Among women, a significant negative correlation \( r = -0.19, p < 0.01 \) was found between structural social support (as measured by the SSQ-N scale) and cognitive-experiential hostility (as measured by the HO scale). Nonsignificant correlations were found between SSQ-N scores and affective-experiential hostility (as measured by the T-Anger scale), and between SSQ-N scores and expressive hostility (as measured by AES scores). The same pattern of relationships was observed among men; a significant negative correlation was found only between structural support and cognitive hostility (for SSQ-N and HO scores, \( r = -0.25, p < 0.004 \)).

Functional social support was evaluated with correlations of the SSQ-S and ISEL scales. Among women, significant negative correlations were found between ISEL scores and affective hostility (as measured by the T-Anger scale, \( r = -0.30, p < 0.003 \)), and between ISEL scores and cognitive hostility (as measured by the HO scale, \( r = -0.28, p < 0.004 \)). For men, significant negative correlations were found between measures of functional support and cognitive hostility (for SSQ-S and HO scores, \( r = -0.21, p < 0.02 \); for ISEL and HO scores, \( r = -0.17, p \))
Significant positive correlations were found between measures of functional support and expressive hostility (for ISEL and AES scores, \( r = .25, p < .004 \); for SSQ-S and AES scores, \( r = .18, p < .04 \)).

**Relationship Between Family History of CHD and Hostility**

A 2 (Family History of CHD vs. No Family History of CHD) x 2 (Sex of Subject) univariate ANOVA was conducted with the HO and T-Anger scales, and AES scores. No significant difference was found on any of the hostility measures among the groups based on CHD family history and sex. Group mean scores for hostility measures are reported in Table 4.

**Relationship Between Family History of CHD and Psychosocial Vulnerability**

Univariate analysis was also conducted with the SSQ-N, SSQ-S, and ISEL scales. On the SSQ-S, significant main effects were found for CHD family history \( [F(1, 243)=7.62, p<.007] \), and for sex \( [F(1, 243)=12.61, p<.001] \). In addition, the interaction effect was significant \( [F(1, 243)=5.49, p=.02] \). In particular, men with a positive family history of CHD reported significantly less satisfaction with their social support resources. Group mean scores for support measures are reported in Table 4.
Family Environment Scale

Univariate analysis was conducted with the Cohesion and Conflict subscales of the FES. No significant difference was found on either subscale among the four groups based on CHD family history and sex. Group mean scores for the FES Cohesion and Conflict subscales are reported in Table 4.

Path Analysis of the Psychosocial Vulnerability Model

Path analysis was conducted to test the psychosocial vulnerability model presented in Figure 1. As depicted in the figure, the basic model incorporated the demographic variables of family size, week of the academic year, and living status (i.e., whether the subject lived with their parents at the time of data collection) as exogenous control variables in addition to hostility and social support variables. All analyses were performed using the Amos (Arbuckle, 1997) computer program for structural equation modeling. These analyses utilized the maximum likelihood method of parameter estimation, and all analyses were performed on the raw sample data.

In order to observe potential interaction effects, the sample was divided into four groups based on CHD family history and sex. Thus, the first objective was to ascertain whether estimates of model parameters varied across the four groups by conducting a multiple group path analysis (Arbuckle, 1997; Kline, 1998). Specifically, cross-group equality constraints were placed on the path coefficients (i.e., values for path coefficients were constrained to be equal
across the four groups), and a chi-square test comparing the constrained model to an unconstrained model (i.e., with path coefficients freely estimated) was conducted. A significant difference in relative fit between the two models would indicate that the direct effects of exogenous variables were different among the groups (Kline, 1998).

As the multiple group chi-square test was significant \( X^2(68) = 154.062, p < .001 \), a series of four pairwise comparisons (again with cross-group equality constraints and a chi-square test comparing the constrained model to an unconstrained model) was conducted to determine exactly where group differences existed. All four chi-square tests were significant: CHD-positive men vs. CHD-positive women \( X^2(26) = 60.461, p < .001 \); CHD-negative men vs. CHD-negative women \( X^2(26) = 81.390, p < .001 \); CHD-positive men vs. CHD-negative men \( X^2(26) = 84.633, p < .001 \); CHD-positive women vs. CHD-negative women \( X^2(26) = 51.080, p = .002 \). Therefore, the next step was to conduct a separate path analysis for each group to determine the direct effects of exogenous variables unique to that group.

Each separate path analysis began with the comparison of two basic models. The first model, depicted in Figure 1, utilized AES scores (Engebretson & Stoney, 1995) as an exogenous variable to determine the direct effects of expressive hostility on functional and structural social support. The second model was identical to the first with the exception of the quadratic terms of AES scores being substituted as the expressive hostility exogenous variable. The
magnitude of path coefficients for AES and quadratic terms of AES was then compared to determine whether relationships among expressive hostility and social support measures were linear or curvilinear. The analysis for each group then proceeded with the model being modified according to the larger of the two expressive hostility coefficients.

In their study examining the relationship between anger expression and lipid concentrations, Engebretson and Stoney (1995) found significant curvilinear associations between AES and HO scores, and AES and T-Anger scores in ANOVAs. They also found a significant curvilinear relationship between AES and lipid concentrations via linear regression analyses that utilized the quadratic term of AES scores. Therefore, the present study compared path analysis models incorporating both the linear and quadratic AES terms in order to explore possible curvilinear relationships among AES and social support variables.

For CHD-positive men and women, a combination of AES and quadratic AES path coefficients best represented the relationships among expressive hostility and social support measures. For CHD-negative men and women, AES path coefficients alone best characterized these relationships. Tables 5-8 present intercorrelations for each of the four groups.

The path analysis for each group continued with the comparison of hierarchical models via model trimming (Kline, 1998). In particular, nonsignificant paths of exogenous control variables (i.e., family size, academic week, and live at home status) were eliminated in order of coefficient magnitude.
(i.e., those of smallest magnitude were dropped first) until a parsimonious model was established that fit the data as well as possible while maintaining paths between hostility and social support variables. Figures 2-5 depict the final models for each group. Reported in Table 9 are the path coefficients from the separate sample analyses. Goodness of fit indices for the various models are presented in Table 10.

The $X^2$ statistic listed in Table 10 allows for a test of the null hypothesis that the model fits the data perfectly (Hatcher, 1994; Kline, 1998). To control for the sensitivity of the $X^2$ statistic to sample size, a relative $X^2$ statistic ($X^2/df$) is also reported in the table. While a ratio of one is the ideal result, various researchers have suggested using ratios ranging between 2 to 1 and 5 to 1 to indicate an acceptable fit of the model to the sample data (Arbuckle, 1997). Table 10 also presents three additional goodness of fit indices: the Joreskog-Sorbom Goodness of Fit Index (GFI, Joreskog & Sorbom, 1996), the Bentler-Bonnet Normed Fit Index (NFI, Bentler & Bonnet, 1980), and the Bentler Comparative Fit Index (CFI, Bentler, 1990). The GFI indicates the proportion of the observed covariances accounted for by the model-implied covariances (Kline, 1998). Values of the GFI range from 0 to 1, with values over .9 indicating an acceptable fit of the model to the sample data. While the GFI reflects the absolute proportion of variance explained by a model, the NFI and the CFI indicate the percentage in improvement of the fit of the proposed model relative to a null model in which the observed variables are assumed to be uncorrelated. The CFI
is interpreted in the same manner as the NFI (i.e., they are both indices of incremental fit relative to a null model) but is less likely to underestimate the goodness of fit with small samples. Values of the NFI and CFI range from 0 to 1, with values over .9 indicating an acceptable fit of the model to the sample data (Arbuckle, 1997; Kline, 1998).

**CHD-Positive Women**

The chi-square test of the model for CHD-positive women was nonsignificant \[\chi^2(8) = 14.67, p<.07\]; the relative \(\chi^2\) statistic \((\chi^2/df)\) was 1.834. The GFI value was .932, the NFI value was .926, and the CFI value was .961. Thus, the model appeared to provide a relatively good fit to the data for CHD-positive women.

**CHD-Negative Women**

The chi-square test of the model for CHD-negative women was significant at the \(p<.05\) level \[\chi^2(9) = 20.832, p<.02\]; the relative \(\chi^2\) statistic was 2.315. The GFI value was .916, the NFI value was .767, and the CFI value was .779. Therefore, the model appeared to provide a reasonably acceptable fit to the data for CHD-negative women.

**CHD-Positive Men**

The chi-square test of the model for CHD-positive men was significant \[\chi^2(8) = 35.448, p<.001\]; the relative \(\chi^2\) statistic was 4.431. The GFI value was .879, the NFI value was .874, and the CFI value was .892. Thus, the model provided a marginal fit to the data for CHD-positive men.
CHD-Negative Men

The chi-square test of the model for CHD-negative men was significant \[ \chi^2(7) = 43.083, p<.001 \]; the relative \( \chi^2 \) statistic was 6.155. The GFI value was .875, the NFI value was .635, and the CFI value was .560. The model provided a poor fit to the data for CHD-negative men.

Curvilinear Relationships in Hostility and Psychosocial Vulnerability

As noted previously, Engebretson and Stoney (1995) utilized ANOVAs with AES scores grouped into quartiles and found significant curvilinear associations between AES and HO scores, and AES and T-Anger scores. They also found a significant curvilinear relationship between AES and lipid concentrations via linear regression analyses that utilized the quadratic term of AES scores. The present study incorporated this same methodology with hostility and support measures in order to discern the interrelationships of cognitive, affective, and behavioral factors of hostility, and explore potential curvilinear relationships between hostility and psychosocial vulnerability.

One-way ANOVAs were conducted utilizing AES divided into quartiles as the independent variable and HO and T-Anger scores, respectively, as the dependent variable. These analyses incorporated the total study sample as results of earlier ANOVAs found no significant differences on hostility scales among groups based on CHD family history and sex. Univariate analyses revealed no significant differences on either HO or T-Anger scales among the
four groups based on AES quartiles. Thus, the finding of curvilinear relationships among hostility measures in the Engebretson and Stoney (1995) study was not replicated.

In addition, a series of linear regression analyses was completed in which social support measures were regressed on both the linear and the quadratic terms of hostility measures. Due to the aforementioned finding of significant group differences on SSQ-S scores, regression analyses were conducted with groups based on CHD family history and sex. Results of linear regression analyses incorporating both linear and quadratic terms of hostility measures as predictor variables showed a significant relationship between the HO quadratic term and SSQ-N scores for CHD-negative women ($\beta = -.309, p = .022$), thus demonstrating a curvilinear relationship between cognitive hostility and quantity of social support. Specifically, results indicated that the tails of the distribution of HO scores were both associated with a diminished quantity of support.
CHAPTER 4

DISCUSSION

Relationship Between Hostility and Psychosocial Vulnerability

Cognitive-Experiential Hostility-Structural Social Support

As measured by their responses on the HO and SSQ-N scales, cognitive-experiential hostility appeared to be negatively related to the quantity of social support for women and men. On the basis of conventional criteria stated by Cohen (1977), the significant correlations for both groups were of medium magnitude and in the predicted direction (i.e., ranging from -.19 to -.25), thus lending support for the present study’s hypothesis #1 (i.e., among women and men, structural social support will be more negatively correlated with the cognitive experience of hostility, as compared to the affective experience or the behavioral expression of hostility).

These findings concur with O’Neil’s (1997) quantitative review of the psychosocial vulnerability model (Smith & Frohm, 1985), a meta-analysis of empirical studies that assessed the hostility and psychosocial vulnerability of persons with and without CHD. However, in the O’Neil (1997) meta-analysis a number of the studies reviewed did not report results separately for men and
women. Therefore, the effect sizes derived from studies of cognitive hostility and structural support were grouped by health status only, thus prohibiting assessment of potential sex differences. In the present study the effects of cognitive hostility on quantity of social support appeared to be more deleterious for men than for women. To determine if this apparent sex difference was statistically significant, a Fischer's $r$-$z'$ transformation of the correlations between HO and SSQ-N subscales was conducted. A z-test was then used to determine whether the difference between correlations for men and women was significantly greater than zero; the result of this test ($z' = -0.47$) was not significant at the two-tailed $\alpha = .05$ level.

To test hypothesis #4 (i.e., among men, the strongest correlation in the hostility-psychosocial vulnerability relationship will be that for cognitive-experiential hostility and structural social support), the difference in magnitude between the correlations for men's HO and SSQ-N scores ($-0.25$), and HO and SSQ-S scores ($-0.21$) was tested for significance by means of the following equation, which provides a $t$ at $n - 3$ degrees of freedom (Steiger, 1980, cited in Cohen, 1983):$
\frac{(r_{xy} - r_{yx})\sqrt{(n - 1)(1 + r_{xx})}}{\sqrt{2\left(\frac{n - 1}{n - 3}\right)|R| + \bar{r}^2 (1 - r_{xx})}}$ where $\bar{r} = \frac{r_{xx} + r_{yx}}{2}$ and $|R| = 1 - r_{xx}^2 - r_{yx}^2 - r_{xy}^2 + 2r_{xy}r_{yx}r_{xx}$. The $t$ so derived was $-5.029$, which for $n - 3 = 133$ df is significant at the two-tailed 1% $\alpha$ level. Although the difference in magnitude between the correlations for men's HO and SSQ-N scores, and HO
and SSQ-S scores was found to be statistically significant, the practical significance of this difference is questionable. Moreover, while a significant negative correlation was found between men's HO and SSQ-N scores ($r = -.25$, $p < .004$), a significant positive correlation of equal magnitude was observed between ISEL and AES scores ($r = .25$, $p < .004$). Thus, hypothesis #4 was not supported.

Expressive Hostility-Structural Social Support

As measured by subjects' AES and SSQ-N scale scores, no significant relationship between expressive hostility and structural social support was found, suggesting that expressive hostility was not associated with quantity of social support among men or women. These results refute hypothesis #2 and are in contrast to those of the O'Neil (1997) meta-analysis, which found that expressive hostility among healthy women was related to greater quantity of social support. However, the O'Neil (1997) review indicated that the effect is not very resistant to unretrieved studies that have found no significant relationship between expressive hostility and decreased quantity of supports (fail safe $N$, Rosenthal, 1991).

Affective-Experiential Hostility-Structural Social Support

As measured by their responses on the T-Anger and SSQ-N scales, no significant relationship between affective-experiential hostility and structural social support was found, suggesting that affective hostility was not associated with decreased quantity of social support among men or women. Again, these
results are in contrast to those of the O'Neil (1997) meta-analysis, which found that in reviewed studies of healthy women and men affective hostility was negatively related to quantity of social support. However, the fail safe N for this result (9) also suggested that this finding is not very resistant to unretrieved studies that have found no significant relationship between affective hostility and decreased quantity of supports.

**Affective-Experiential Hostility-Functional Social Support**

As measured by subjects' responses on the T-Anger, SSQ-S, and ISEL scales, affective–experiential hostility appeared to be negatively related to the quality of social support for women (correlations for men were in the predicted direction but were nonsignificant). These results are similar to those of the O'Neil (1997) quantitative review, in which the affective experience of hostility also appeared to be more negatively associated with the quality of social support among healthy women than among healthy men.

On the basis of conventional criteria stated by Cohen (1977), the significant correlation of -.30 between women's T-Anger and ISEL scores was of medium magnitude and in the predicted direction. To test hypotheses #5 and #7 (e.g., among women, functional social support will be more negatively correlated with affective-experiential hostility, as opposed to cognitive-experiential hostility or expressive hostility), the difference in magnitude between the correlations for women's T-Anger-ISEL scores (-.30) and HO-ISEL scores (-.28) was tested for significance by means of the aforementioned equation by Steiger (1980, cited in
Cohen, 1983), which provides a $t$ at $n - 3$ degrees of freedom. The $t$ so derived was -5.893, which for $n - 3 = 107$ df is significant at the two-tailed 1% $\alpha$ level, thus lending support for the present study's hypotheses #5 and #7 (i.e., among women, the strongest correlation in the hostility-psychosocial vulnerability relationship will be that for affective-experiential hostility and functional social support). However, while the difference in magnitude between the correlations for women's T-Anger-ISEL scores and HO-ISEL scores was found to be statistically significant, the practical significance of this difference is questionable.

Cognitive-Experiential Hostility-Functional Social Support

As measured by responses on the HO scale, cognitive-experiential hostility appeared to be negatively related to the quality of social support (SSQ-S, ISEL) for women and men. On the basis of conventional criteria stated by Cohen (1977), the significant correlations for both groups were of medium magnitude and in the predicted direction (i.e., ranging from -.17 to -.28), thus lending support for the present study's hypothesis #6 (i.e., among men, functional social support will be more negatively correlated with cognitive-experiential hostility, as opposed to affective-experiential hostility or expressive hostility).

Expressive Hostility-Functional Social Support

As measured by AES, expressive hostility appeared to be significantly related to the quality of social support (SSQ-S, ISEL) only for men. However, as noted previously this relationship appeared to be positive. On the basis of
conventional criteria stated by Cohen (1977), the significant positive correlations for men were of medium magnitude (i.e., ranging from .18 to .25); correlations for women were also positive but nonsignificant. These results are in contrast to those of the O'Neil (1997) meta-analysis, which found that in reviewed studies of healthy women and men expressive hostility was negatively related to quality of social support. However, in the O'Neil (1997) meta-analysis a number of the studies reviewed did not report results separately for men and women, thus prohibiting assessment of potential sex differences. In the present study the effects of expressive hostility on quality of social support appeared to be more positive for men than for women.

**Relationship Between Family History of CHD and Hostility**

Univariate analyses revealed no significant differences on any of the hostility measures (i.e., HO and T-Anger scales, and AES scores) among the four groups based on CHD family history and sex, thus refuting hypothesis #8 (i.e., persons with a family history of CHD will exhibit higher scores on measures of hostility as compared to persons without a family history of CHD).

**Relationship Between Family History of CHD and Psychosocial Vulnerability**

Univariate analyses of measures of psychosocial vulnerability (i.e., SSQ-N, SSQ-S, and ISEL scales) found that persons with a positive family history of CHD (particularly men) reported significantly less satisfaction with their social
support resources, thus lending qualified support for hypothesis #9 (i.e., persons with a family history of CHD will exhibit lower scores on measures of social support as compared to persons without a family history of CHD).

**Family Environment Scale**

Univariate analyses conducted with the Cohesion and Conflict FES subscales found no significant difference on either subscale among the four groups based on CHD family history and sex, thus refuting hypotheses #10 and #11 (e.g., persons with a family history of CHD will report less family support (as measured by their responses on the FES Cohesion subscale), as compared to persons without a family history of CHD).

**Path Analysis of the Psychosocial Vulnerability Model**

In order to observe potential interaction effects, the sample was divided into four groups based on CHD family history and sex. A multiple group path analysis (Arbuckle, 1997; Kline, 1998) was then conducted to determine if group membership moderated the relationships between hostility and social support variables as depicted in Figure 1. After path coefficients were constrained to be equal across groups, results of the multiple group analysis indicated that there were significant differences in the direct effects of exogenous variables among the four groups. Moreover, a series of pairwise comparisons revealed that a unique pattern of direct effects existed for each group. Therefore, a separate
path analysis was conducted for each group. The following sections summarize the findings of the separate analyses and the conclusions that can be drawn from these results.

**CHD-Positive Women**

The path analysis for CHD-positive women yielded a model that fit the data better than the models for any of the other three groups. A comparison of two basic models incorporating path coefficients for either AES or quadratic terms of AES determined that whereas the relationship between expressive hostility and structural social support appeared to be curvilinear (and nonsignificant), the relationship between expressive hostility and functional support appeared to be linear and *positive* (i.e., expressive hostility was associated with increased quality of social support). In particular, a statistically significant (*p* < .05) path coefficient was observed for the direct effect of AES scores on ISEL scores.

Taking into consideration the psychosocial vulnerability model (Smith & Frohm, 1985), which hypothesizes that hostile persons experience a deficient quality of interpersonal relationships due to their hostile nature, this result is counterintuitive. While a negative relationship between cognitive hostility and functional support was observed, the path coefficient for the direct effect of HO scores on ISEL scores fell short of significance. Path coefficients representing the direct effects of cognitive hostility on structural support, and affective hostility on structural and functional support were also negative and nonsignificant.
**CHD-Negative Women**

The path analysis for this sample group yielded a model that provided an acceptable fit to the data. A comparison of two basic models incorporating path coefficients for either AES or quadratic terms of AES found that the relationships between expressive hostility, structural social support, and functional social support appeared to be linear and positive. However, none of the path coefficients for the direct effects of AES on support measures reached significance. Path coefficients representing the direct effects of affective hostility on structural support, and cognitive hostility on structural and functional support were nonsignificant and negative. A statistically significant, negative path coefficient was observed for the direct effect of affective hostility on functional support (as revealed by T-Anger and ISEL scores). This finding supports the psychosocial vulnerability model (Smith & Frohm, 1985) and concurs with those of the O’Neil (1997) meta-analysis, which also found a significant negative association between affective hostility and quality of social support among reviewed studies of healthy women.

**CHD-Positive Men**

The path analysis for this sample group yielded a model that provided a marginal fit to the data. A comparison of two basic models incorporating path coefficients for either AES or quadratic terms of AES found that the relationship between expressive hostility and functional social support appeared to be linear and positive; the relationship between expressive hostility and structural support...
was curvilinear. However, none of the path coefficients for the direct effects of expressive hostility on structural or functional social support reached significance. Whereas the path coefficient for the direct effect of affective hostility on structural support was positive, path coefficients for the direct effects of T-Anger scores on functional support measures were negative; none of the path coefficients representing affective hostility-social support associations reached significance.

As derived from HO and SSQ-N scores, a statistically significant, negative path coefficient was observed for the direct effect of cognitive hostility on structural social support (path coefficients for the direct effects of cognitive hostility on functional support measures were negative and nonsignificant). This finding supports the psychosocial vulnerability model (Smith & Frohm, 1985) and concurs with those of the O'Neil (1997) meta-analysis, which also found a highly significant relationship between cognitive hostility and decreased quantity of social support among reviewed studies of healthy men and women.

**CHD-Negative Men**

The path analysis for this sample group yielded a model that provided a poor fit to the data. Path coefficients representing the direct effects of cognitive and affective hostility on social support were nonsignificant. A comparison of two basic models incorporating path coefficients for either AES or quadratic terms of AES found that the relationships among expressive hostility and functional social support variables appeared to be linear, significant, and positive (the path
coefficient for expressive hostility and structural support was also linear and positive, but nonsignificant). Similar to the findings for CHD-positive women, statistically significant ($p < .05$) path coefficients were observed for the direct effects of AES scores on ISEL and SSQ-S scores (i.e., expressive hostility was associated with increased quality of social support). These results are in contrast to what would be expected based on the psychosocial vulnerability model (Smith & Frohm, 1985).

**Conclusions**

The present study found qualified support for the validity of the psychosocial vulnerability model (Smith & Frohm, 1985). For women, correlational analyses indicated a significant negative relationship between affective-experiential hostility and functional social support; results of path analyses found a significant direct effect of affective hostility on functional support in the predicted direction for CHD-negative women. The effect of affective-experiential hostility on functional social support appeared to be more deleterious for women than for men.

In addition, correlational analyses revealed a significant negative relationship between cognitive-experiential hostility and structural social support for men; results of path analyses found a significant direct effect in the predicted direction for CHD-positive men. Thus, the effect of cognitive hostility on quantity of social support appeared to be more deleterious for men than for women.
Perhaps the most surprising finding was the positive relationship between expressive hostility and functional social support. This association was significant in correlational analyses for men; results of path analyses found a significant direct effect of expressive hostility on functional support in the positive direction for CHD-negative men and CHD-positive women. These findings refute the psychosocial vulnerability model (Smith & Frohm, 1985), and are in contrast to those of the O’Neil (1997) meta-analysis, which found that among healthy women and men expressive hostility was negatively related to quality of social support.

In regard to the association of family history of CHD, ANOVA results showed no significant differences on scales of hostility or family environment (as measured by Cohesion and Conflict subscales of the FES) between groups based on CHD family history. As noted previously, because hostility has been linked to other genetic markers of CHD including blood pressure reactivity (Suls & Wan, 1993), and body mass index (Houston & Vavak, 1991), the present study addressed the related question of whether hostility is associated with a family history of CHD. Taken into consideration with the aforementioned results of genetics research, such a relationship would have provided converging evidence that the link between hostility and CHD may reflect shared genetic variance (Suls & Sanders, 1989). However, results of the present study do not support this hypothesis as no significant association was found between hostility and CHD family history.
ANOVA also revealed no significant sex differences on scales of hostility or family environment (as measured by Cohesion and Conflict subscales of the FES). The lack of sex differences on hostility measures in the present study is in contrast to the results of previous research. In a review of studies of sex differences in hostility and anger, Stoney and Engebretson (1994) noted that the majority of previous research has shown that whereas women and men generally report comparable levels of affective-experiential hostility, men typically endorse greater levels of cognitive-experiential hostility than do women. Regarding the behavioral expression of hostility, Stoney and Engebretson (1994) observed that “in general, females appear to express their anger in a communicative [i.e., nonthreatening] fashion to a greater degree than males, but are less likely to express their anger in an aggressive [i.e., threatening] fashion, relative to males” (p. 225).

The findings of the present study also yield a number of suggestions in regard to CHD prevention and treatment efforts. In particular, as cognitive-experiential hostility was consistently associated with psychosocial vulnerability among men, prevention and treatment programs could identify men high in cognitive hostility (e.g., through HO scale administration) and consider the use of cognitive psychotherapy approaches to address cognitive distortions involving “negative beliefs about human nature in general (i.e., cynicism) and the belief that disagreeable behavior of others is intentionally directed at the self (i.e., hostile attributions)” (Smith, 1992, pp. 139-140). For women, affective-
experiential hostility appeared to be more salient in relation to psychosocial vulnerability. Thus, CHD prevention and treatment efforts could be tailored to emphasize modification of hostile affect with women.

Limitations of the Present Study

A number of limitations exist in the present study. In particular, due to the cross-sectional design of the study, it was not possible to evaluate causal relationships between hostility and psychosocial vulnerability. In the present study hostility was viewed as an exogenous (i.e., causal) variable, as studies comparing twins have found a significant genetic influence on HO scores (Carmelli, Swan, & Rosenman, 1990; Smith, McGonigle, Turner, Ford, & Slattery, 1991), scores on a measure of trait anger (Cates, Houston, Vavak, Crawford, & Uttley, 1992), SI Potential for Hostility ratings (Matthews, Rosenman, Dembroski, Harris, & MacDougall, 1984), and scores on measures of verbal and behavioral aggression (Coccaro, Bergeman, Kavoussi, & Serocznyski, 1997). Prospective studies could determine whether in fact greater hostility precedes a deficiency in social support, or if hostility increases subsequent to diminished support.

In addition, path analysis results are limited to the extent that they were derived from a multiple group analysis (Arbuckle, 1997; Kline, 1998) of small samples. While this analytic strategy allowed for the examination of interaction effects based on CHD family history and sex, the sample sizes of the four groups
(i.e., N's ranging from 55-70) reduced the power of the study and the statistical stability of the path coefficient estimates. Kline (1998) noted that sample sizes of less than 100 subjects are considered small and are more likely to yield estimates of questionable stability.

Moreover, the fit of the path models for the two male samples was marginal, at best. Inspection of modification indices (which indicate the improvement in fit by the addition of model paths; Hatcher, 1994; Arbuckle, 1997; Kline, 1998) indicated that significant increases in the fit of these models could be obtained by adding reciprocal paths among social support variables. However, these paths were not added as they would not be based on theoretical knowledge. Such modifications are termed "data-driven modifications" because they are based on sample characteristics rather than theory (Hatcher, 1994). MacCallum (1986) demonstrated that data-driven modifications often lead to models that do not generalize to other samples or the population of interest, particularly with samples of less than 100. Again, future studies incorporating a prospective design could yield information regarding the relationships between structural and functional dimensions of social support.

Finally, results of the present study were derived from a sample of college undergraduates, and therefore may not be generalizable to other samples or the general population. Further empirical research is needed to validate the psychosocial vulnerability model in nonstudent samples of men and women.
Summary

The present study addressed a number of issues related to the psychosocial vulnerability model (Smith & Frohm, 1985) of the hostility-CHD relationship, and represents the first known attempt to examine the association of family history of CHD and hostility among young, healthy individuals. Although univariate analyses found no significant differences on scales of hostility or family environment among groups based on CHD family history and sex, ANOVA results showed that persons with a positive family history of CHD (particularly men) reported significantly less satisfaction with their social support resources.

In contrast to the psychosocial vulnerability model (Smith & Frohm, 1985), and the results of the O'Neil (1997) meta-analysis, a significant positive relationship was found between expressive hostility and functional social support. This association was significant in correlational analyses for men; results of path analyses found a significant direct effect of expressive hostility on functional support in the positive direction for CHD-negative men and CHD-positive women. This counterintuitive result of a higher quality of social support for expressively hostile persons may simply reflect the positive aspects of a greater willingness to discuss problems and emotions with close friends. Stoney and Engebretson (1994) suggested that expressive hostility be considered in terms of two modes of expression: "Communicative expression includes the nonthreatening expression of anger and hostility, whereas aggressive expression incorporates the expression of anger and hostility with intent of
inflicting harm (either physical or verbal)” (p. 218). Future research examining these dimensions could help to elucidate the expressive aspect of hostility and clarify its impact on social support.

Curvilinear Relationships in Hostility and Psychosocial Vulnerability

In their study examining the relationship between anger expression and lipid concentrations, Engebretson and Stoney (1995) utilized ANOVAs with AES scores grouped into quartiles and found significant curvilinear associations between AES and HO scores, and AES and T-Anger scores. They also found a significant curvilinear relationship between AES and lipid concentrations via linear regression analyses that utilized the quadratic term of AES scores. The present study incorporated this same methodology with hostility and support measures in order to discern the interrelationships of cognitive, affective, and behavioral factors of hostility, and explore potential curvilinear relationships between hostility and psychosocial vulnerability.

One-way ANOVAs were conducted utilizing AES divided into quartiles as the independent variable and HO and T-Anger scores, respectively, as the dependent variable. These analyses incorporated the total study sample as results of earlier ANOVAs found no significant differences on hostility scales among groups based on CHD family history and sex. Univariate analyses revealed no significant differences on either HO or T-Anger scales among the four groups based on AES quartiles. Thus, the finding of curvilinear relationships
among hostility measures in the Engebretson and Stoney (1995) study was not replicated.

In addition, a series of linear regression analyses was completed in which social support measures were regressed on both the linear and the quadratic terms of hostility measures. Due to the aforementioned finding of significant group differences on SSQ-S scores, regression analyses were conducted with groups based on CHD family history and sex. Results of linear regression analyses incorporating both linear and quadratic terms of hostility measures as predictor variables showed a significant relationship between the HO quadratic term and SSQ-N scores for CHD-negative women ($\beta = -.309, p = .022$), thus demonstrating a curvilinear relationship between cognitive hostility and quantity of social support. Specifically, results indicated that the tails of the distribution of HO scores were both associated with a diminished quantity of support.

Perhaps there is some benefit with regard to social relationships in holding a moderate degree of cynicism. A low level of cognitive hostility may be suggestive of an overly naïve view of the world that predisposes one to being taken advantage of by others. On the other hand, an overly cynical outlook is likely to preclude one from even developing social relationships. In any event, it appears that the associations among factors of hostility and social support do not always follow a negative, linear trend. Replication of the present findings in studies incorporating larger samples of men and women is necessary before firm conclusions can be drawn. In addition, prospective studies could test whether a
communicative expression of anger (Stoney and Engebretson, 1994) reduces the risk of CHD by means of improving quality of social support. Data bearing on this question could be of great benefit in enhancing CHD prevention and treatment efforts. Further research is needed to clarify and refine the psychosocial vulnerability model of the hostility-CHD relationship.
LIST OF REFERENCES


Browne, M. W., & Mels, G. (1992). *RAMONA user's guide*. The Ohio State University, Columbus, Ohio.


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APPENDIX A

TABLES
<table>
<thead>
<tr>
<th>Demographic Variable</th>
<th>CHD-Positive Family History Group (n = 121)</th>
<th>CHD-Negative Family History Group (n = 125)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Mean (±SD)</td>
<td>19.41 (±1.98)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>5.8%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Asian-American</td>
<td>7.4%</td>
<td>17.7%</td>
</tr>
<tr>
<td>Caucasian</td>
<td>83.5%</td>
<td>74.2%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.8%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Native American</td>
<td>0.8%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Other</td>
<td>0.0%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Family Size (including subject)</td>
<td>Mean</td>
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<td>Living at Home with Parents</td>
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<tr>
<td>Yes</td>
<td>17.8%</td>
<td>19.2%</td>
</tr>
<tr>
<td>No</td>
<td>82.2%</td>
<td>80.8%</td>
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Table 1: Demographic Information.
Table 2: Correlations for Women. Superscripts indicate significant correlations, $^a = p<.01$.

<table>
<thead>
<tr>
<th>Measure</th>
<th>HO</th>
<th>TAS</th>
<th>AES</th>
<th>SSQ-N</th>
<th>SSQ-S</th>
<th>ISEL</th>
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</thead>
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<tr>
<td>HO</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>TAS</td>
<td>.47$^a$</td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>AES</td>
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<td>.10</td>
<td>1.0</td>
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</tr>
<tr>
<td>SSQ-N</td>
<td>-.19$^a$</td>
<td>-.12</td>
<td>.05</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSQ-S</td>
<td>-.19</td>
<td>-.12</td>
<td>.08</td>
<td>.35$^a$</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>ISEL</td>
<td>-.28$^a$</td>
<td>-.30$^a$</td>
<td>.17</td>
<td>.37$^a$</td>
<td>.34$^a$</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**Note.** N = 110. HO = Cook-Medley Hostility Scale (Cook & Medley, 1954); TAS = Trait Anger Scale (TAS, Spielberger, Jacobs, Russell, & Crane, 1983); AES = Anger Expression Style (Engebretson & Stoney, 1995); SSQ-N = Social Support Questionnaire-Number (Sarason et al., 1983); SSQ-S = Social Support Questionnaire-Satisfaction (Sarason et al., 1983); ISEL = Interpersonal Support Evaluation List (Cohen & Hoberman, 1983).
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<thead>
<tr>
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<th>AES</th>
<th>SSQ-N</th>
<th>SSQ-S</th>
<th>ISEL</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
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<td></td>
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<tr>
<td>TAS</td>
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<tr>
<td>AES</td>
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<tr>
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<td>.08</td>
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</tr>
<tr>
<td>SSQ-S</td>
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<td>-.14</td>
<td>.18&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.37&lt;sup&gt;a&lt;/sup&gt;</td>
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</tr>
<tr>
<td>ISEL</td>
<td>-.17&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-.06</td>
<td>.25&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.48&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.55&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Table 3: Correlations for Men. Superscripts indicate significant correlations, <sup>a</sup> = p<.01; <sup>b</sup> = p<.05.

Note. N = 136. HO = Cook-Medley Hostility Scale (Cook & Medley, 1954); TAS = Trait Anger Scale (TAS, Spielberger, Jacobs, Russell, & Crane, 1983); AES = Anger Expression Style (Engebretson & Stoney, 1995); SSQ-N = Social Support Questionnaire-Number (Sarason et al., 1983); SSQ-S = Social Support Questionnaire-Satisfaction (Sarason et al., 1983); ISEL = Interpersonal Support Evaluation List (Cohen & Hoberman, 1983).
<table>
<thead>
<tr>
<th>Measure</th>
<th>CHD-Positive Men (n = 66)</th>
<th>CHD-Positive Women (n = 55)</th>
<th>CHD-Negative Men (n = 70)</th>
<th>CHD-Negative Women (n = 55)</th>
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</thead>
<tbody>
<tr>
<td>HO</td>
<td>24.55 (7.76)</td>
<td>22.77 (7.40)</td>
<td>22.64 (7.57)</td>
<td>22.25 (8.66)</td>
</tr>
<tr>
<td>TAS</td>
<td>19.76 (6.20)</td>
<td>19.02 (4.82)</td>
<td>17.83 (5.10)</td>
<td>19.25 (4.99)</td>
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<tr>
<td>AES</td>
<td>4.04 (1.43)</td>
<td>3.87 (1.53)</td>
<td>4.03 (1.20)</td>
<td>4.05 (1.22)</td>
</tr>
<tr>
<td>SSQ-N</td>
<td>3.13 (1.63)</td>
<td>3.96 (1.52)</td>
<td>3.88 (2.06)</td>
<td>3.89 (1.83)</td>
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<tr>
<td>SSQ-S</td>
<td>5.05 (.78)</td>
<td>5.53 (.49)</td>
<td>5.53 (.49)</td>
<td>5.55 (.64)</td>
</tr>
<tr>
<td>ISEL</td>
<td>35.15 (7.72)</td>
<td>37.29 (6.40)</td>
<td>37.33 (6.64)</td>
<td>37.45 (6.50)</td>
</tr>
<tr>
<td>FES Cohesion</td>
<td>6.00 (2.42)</td>
<td>6.44 (2.69)</td>
<td>6.87 (1.70)</td>
<td>6.80 (1.96)</td>
</tr>
<tr>
<td>FES Conflict</td>
<td>3.76 (1.89)</td>
<td>4.11 (2.07)</td>
<td>3.76 (1.91)</td>
<td>3.91 (1.87)</td>
</tr>
</tbody>
</table>

Table 4: Group Mean Scores on Hostility, Social Support, and FES Measures. Standard deviations are in parentheses.

Note. HO = Cook-Medley Hostility Scale (Cook & Medley, 1954); TAS = Trait Anger Scale (TAS, Spielberger, Jacobs, Russell, & Crane, 1983); AES = Anger Expression Style (Engenretson & Stoney, 1995); SSQ-N = Social Support Questionnaire-Number (Sarason et al., 1983); SSQ-S = Social Support Questionnaire-Satisfaction (Sarason et al., 1983); ISEL = Interpersonal Support Evaluation List (Cohen & Hoberman, 1983); FES = Family Environment Scale (Moos, Insel, & Humphrey, 1974).
<table>
<thead>
<tr>
<th>Measure</th>
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<th>TAS</th>
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<th>AES2</th>
<th>SSQ-N</th>
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<th>ISEL</th>
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<tr>
<td>HO</td>
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<td></td>
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</tr>
<tr>
<td>TAS</td>
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<td>1.0</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>AES</td>
<td>-0.04</td>
<td>-0.03</td>
<td>1.0</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>AES2</td>
<td>-0.04</td>
<td>-0.02</td>
<td>0.97**</td>
<td>1.0</td>
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<td></td>
</tr>
<tr>
<td>SSQ-N</td>
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<td>-0.13</td>
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<tr>
<td>SSQ-S</td>
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<td>0.07</td>
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<td>0.31*</td>
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<tr>
<td>ISEL</td>
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<td>0.24</td>
<td>0.22</td>
<td>0.30*</td>
<td>0.29*</td>
<td>1.0</td>
</tr>
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</table>

Table 5: Correlations for CHD-Positive Women. Asterisks indicate significant correlations, ** = p<.01; * = p<.05.

Note. N = 55. HO = Cook-Medley Hostility Scale (Cook & Medley, 1954); TAS = Trait Anger Scale (TAS, Spielberger, Jacobs, Russell, & Crane, 1983); AES = Anger Expression Style (Engebretson & Stoney, 1995); AES2 = Anger Expression Style quadratic term; SSQ-N = Social Support Questionnaire-Number (Sarason et al., 1983); SSQ-S = Social Support Questionnaire-Satisfaction (Sarason et al., 1983); ISEL = Interpersonal Support Evaluation List (Cohen & Hoberman, 1983).
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<th>AES</th>
<th>SSQ-N</th>
<th>SSQ-S</th>
<th>ISEL</th>
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</thead>
<tbody>
<tr>
<td>HO</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>TAS</td>
<td>.48**</td>
<td>1.0</td>
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<td>AES</td>
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</tr>
<tr>
<td>SSQ-N</td>
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<td>SSQ-S</td>
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<tr>
<td>ISEL</td>
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<td>-.35**</td>
<td>.09</td>
<td>.44**</td>
<td>.39**</td>
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</tr>
</tbody>
</table>

Table 6: Correlations for CHD-Negative Women. Asterisks indicate significant correlations, ** = p<.01; * = p<.05.

Note. N = 55. HO = Cook-Medley Hostility Scale (Cook & Medley, 1954); TAS = Trait Anger Scale (TAS, Spielberger, Jacobs, Russell, & Crane, 1983); AES = Anger Expression Style (Engebretson & Stoney, 1995); SSQ-N = Social Support Questionnaire-Number (Sarason et al., 1983); SSQ-S = Social Support Questionnaire-Satisfaction (Sarason et al., 1983); ISEL = Interpersonal Support Evaluation List (Cohen & Hoberman, 1983).
Table 7: Correlations for CHD-Positive Men. Asterisks indicate significant correlations, ** = $p<.01$; * = $p<.05$.

Note. N = 66. HO = Cook-Medley Hostility Scale (Cook & Medley, 1954); TAS = Trait Anger Scale (TAS, Spielberger, Jacobs, Russell, & Crane, 1983); AES = Anger Expression Style (Engebretson & Stoney, 1995); AES2 = Anger Expression Style quadratic term; SSQ-N = Social Support Questionnaire-Number (Sarason et al., 1983); SSQ-S = Social Support Questionnaire-Satisfaction (Sarason et al., 1983); ISEL = Interpersonal Support Evaluation List (Cohen & Hoberman, 1983).
Table 8: Correlations for CHD-Negative Men. Asterisks indicate significant correlations, ** = p<.01; * = p<.05.

<table>
<thead>
<tr>
<th>Measure</th>
<th>HO</th>
<th>TAS</th>
<th>AES</th>
<th>SSQ-N</th>
<th>SSQ-S</th>
<th>ISEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>HO</td>
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<td></td>
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<tr>
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<td></td>
</tr>
<tr>
<td>SSQ-N</td>
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<td>-.01</td>
<td>.05</td>
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<td></td>
</tr>
<tr>
<td>SSQ-S</td>
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<td>-.10</td>
<td>.34**</td>
<td>.35**</td>
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<tr>
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<td>.06</td>
<td>.30*</td>
<td>.46**</td>
<td>.58**</td>
<td>1.0</td>
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</table>

Note. N = 70. HO = Cook-Medley Hostility Scale (Cook & Medley, 1954); TAS = Trait Anger Scale (TAS, Spielberger, Jacobs, Russell, & Crane, 1983); AES = Anger Expression Style (Engebretson & Stoney, 1995); SSQ-N = Social Support Questionnaire-Number (Sarason et al., 1983); SSQ-S = Social Support Questionnaire-Satisfaction (Sarason et al., 1983); ISEL = Interpersonal Support Evaluation List (Cohen & Hoberman, 1983).
### Table 9: Path Coefficients from Separate Sample Analyses

* Asterisks indicate significant coefficients, * = p<.05.

**Note.** a Unstandardized (Standardized). HO = Cook-Medley Hostility Scale (Cook & Medley, 1954); TAS = Trait Anger Scale (TAS, Spielberger, Jacobs, Russell, & Crane, 1983); AES = Anger Expression Style (Engebretson & Stoney, 1995); AES2 = Anger Expression Style quadratic term; SSQ-N = Social Support Questionnaire-Number (Sarason et al., 1983); SSQ-S = Social Support Questionnaire-Satisfaction (Sarason et al., 1983); ISEL = Interpersonal Support Evaluation List (Cohen & Hoberman, 1983); ACADWK = academic week; LIVEHOME = live at home status; FAMSIZE = family size.
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<tr>
<th>Model</th>
<th>$X^2$</th>
<th>$df$</th>
<th>$p$</th>
<th>$X^2/df$</th>
<th>GFI</th>
<th>NFI</th>
<th>CFI</th>
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</thead>
<tbody>
<tr>
<td>CHD-Positive Women</td>
<td>14.67</td>
<td>8</td>
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<tr>
<td>CHD-Negative Women</td>
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<td>CHD-Negative Men</td>
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<td>&lt;.001</td>
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<td>.875</td>
<td>.635</td>
<td>.560</td>
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</tbody>
</table>

Table 10: Goodness of Fit Indices for Group Models.

*Note.* Total $N = 246$. GFI = Goodness of fit index; NFI = normed fit index; CFI = comparative fit index.
APPENDIX B

FIGURES
Figure 1. Psychosocial Vulnerability Model
Figure 2. Path Model for CHD-Positive Women
Figure 3. Path Model for CHD-Negative Women
Figure 4. Path Model for CHD-Positive Men
Figure 5. Path Model for CHD-Negative Men
APPENDIX C

MEASURES
COOK-MEDLEY SCALE

Please respond to every statement by indicating whether it is true or false for you. If you are not sure how to respond, decide whether the statement is mostly true or mostly false and pick that response. Be sure to respond to every statement. 

Please write a 0 or 1 on the blank line to the right of each statement.

0 = False
1 = True

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 a 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 had 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. My relatives are nearly all in sympathy with me. 

10. Most people are honest chiefly through fear of being caught. 

11. Most people will use somewhat unfair means to gain profit or an advantage rather than to lose it. 

12. I commonly wonder what hidden reason other people may have for doing something nice for me. 

13. It makes me impatient to have people ask my advice or otherwise interrupt me when I am working on something important. 

14. I feel that I have often been punished without cause. 

15. I am against giving money to beggars. 

16. Some of my family have habits that bother and annoy me very much. 

17. My way of doing things is apt to be misunderstood by others.
0 = False
1 = True

18. I can be friendly with people who do things which I consider wrong. 
19. I don't blame anyone for trying to grab everything he can get in this world. 
20. No one cares much what happens to you. 
21. It is safer to trust nobody. 
22. I do not 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. People often disappoint me. 
30. I have often met people who were supposed to be experts who were no better I am. 
31. It makes me feel like a failure when I hear of the success of someone I know well. 
32. I am not easily angered. 
33. People generally demand more respect for their own rights than they are willing to allow for others. 
34. I am quite often not in on the gossip and talk of the group I belong to. 
35. I have often found people jealous of my good ideas just because they had not thought of them first. 
36. I have sometimes stayed away from another person because I feared doing or saying something that I might regret afterwards. 
37. I would certainly enjoy beating a crook at his own game. 
38. I have at times had to be rough with people who were rude or annoying. 
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.

98
0 = False
1 = True

41. 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.   
42. I like to keep people guessing what I'm going to do next.   
43. When a man is with a woman he is usually thinking about things related to her sex.   
44. I do not try to cover up my poor opinion or pity of a person so that he won't know how I feel.   
45. I strongly defend my own opinions as a rule.   
46. I frequently ask people for advice.   
47. 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 onto those under them.   
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 large number of people are guilty of bad sexual conduct.
Instructions

A number of statements which people have used to describe themselves are given below. Read each statement and give your answer using the scale below to the right of the question, which best indicates the intensity of your feelings right now. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to best describe the intensity of your feelings right now. Please answer every item.

1 = Not At All
2 = Somewhat
3 = Moderately So
4 = Very Much So

1. I am mad. __________
2. I feel angry. __________
3. I am burned up. __________
4. I feel like I'm about to explode. __________
5. I feel like banging on the table. __________
6. I feel like yelling at somebody. __________
7. I feel like swearing. __________
8. I am furious. __________
9. I feel like hitting someone. __________
10. I feel like breaking things. __________
Instructions

A number of statements which people have used to describe themselves are given below. Read each statement and give your answer using the scale below to the right of the question, which best indicates how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to best describe how you generally feel. Please answer every item.

1 = Almost Never
2 = Sometimes
3 = Often
4 = Almost Always

1. I have a fiery temper. ___
2. I am quick-tempered. ___
3. I am a hotheaded person. ___
4. It makes me furious when I am criticized in front of others. ___
5. I get angry when I'm slowed down by others' mistakes. ___
6. I feel infuriated when I do a good job and get a poor evaluation. ___
7. I fly off the handle. ___
8. I feel annoyed when I am not given recognition for doing good work. ___
9. When I get mad, I say nasty things. ___
10. When I get frustrated, I feel like hitting someone. ___
Instructions

For the following items, circle the number which best describes how you generally act or feel when you are angry.

<table>
<thead>
<tr>
<th>When angry or furious</th>
<th>Almost Never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Almost Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I control my temper.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. I express my anger.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. I keep things in.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. I control my behavior.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. I pout or sulk.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. I withdraw from people.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. I control my angry feelings.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. I make sarcastic remarks to others.</td>
<td>1</td>
<td>2</td>
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<td>4</td>
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<tr>
<td>9. I keep my cool.</td>
<td>1</td>
<td>2</td>
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<tr>
<td>10. I do things like slam doors.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>11. I boil inside, but I don't show it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>12. I try to be tolerant and understanding.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13. I argue with others.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14. I tend to harbor grudges that I don't tell anyone about.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>15. I strike out at whatever infuriates me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>16. I am secretly quite critical of others.</td>
<td>1</td>
<td>2</td>
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<td>4</td>
</tr>
<tr>
<td>When angry or furious</td>
<td>Almost Never</td>
<td>Sometimes</td>
<td>Often</td>
<td>Almost Always</td>
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<tr>
<td>17. I am usually quite patient with others.</td>
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<tr>
<td>18. I am angrier than I am willing to admit.</td>
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<tr>
<td>19. I calm down faster than most people.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20. I say nasty things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21. I am irritated a great deal more than people are aware.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22. I lose my temper.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23. If someone annoys me I am apt to tell him or her how I feel.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24. I stop myself from losing my temper.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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</tbody>
</table>
INSTRUCTIONS:

The following questions ask about people in your environment who provide you with help or support. Each question has two parts. For the first part, list all the people you know, excluding yourself, whom you can count on for help or support in the manner described. Give the person's initials and their relationship to you (see example). Do not list more than one person next to each of the letters beneath the question.

For the second part, circle how satisfied you are with the overall support you have.

If you have no support for a question, check the words 'No one,' but still rate your level of satisfaction. Do not list more than nine persons per question.

Please answer all questions as best you can. All your responses will be kept confidential.

EXAMPLE:

Who do you know whom you can trust with information that could get you in trouble?

No one 1) T.N. (brother) 4) T.N. (father) 7) 2) L.M. (friend) 5) L.M. (employer) 8) 3) R.S. (friend) 6) 9)

How satisfied?

6 - very satisfied 5 - fairly satisfied 4 - a little satisfied 3 - a little dissatisfied 2 - fairly dissatisfied 1 - very dissatisfied
1. Whom can you really count on to listen to you when you need to talk?

<table>
<thead>
<tr>
<th>Option</th>
<th>1</th>
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2. Whom could you really count on to help you if a person whom you thought was a good friend insulted you and told you that he/she didn't want to see you again?

<table>
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<tr>
<th>Option</th>
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3. Whose lives do you feel that you are an important part of?

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4. Whom do you feel would help you if you were married and had just separated from your spouse?

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5. Whom could you really count on to help you out in a crisis situation, even though they would have to go out of their way to do so?

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6. Whom can you talk with frankly, without having to watch what you say?

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</table>
7. Who helps you feel that you truly have something positive to contribute to others?

<table>
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8. Whom can you really count on to distract you from your worries when you feel under stress?

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<tr>
<th>No one</th>
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9. Whom can you really count on to be dependable when you need help?

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<tr>
<th>No one</th>
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10. Whom could you really count on to help you out if you had just been fired from your job or expelled from school?

<table>
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<tr>
<th>No one</th>
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</table>

11. With whom can you totally be yourself?

<table>
<thead>
<tr>
<th>No one</th>
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12. Whom do you feel really appreciates you as a person?

<table>
<thead>
<tr>
<th>No one</th>
<th>1</th>
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</table>
13. Whom can you really count on to give you useful suggestions that help you to avoid making mistakes?

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How satisfied?

- 6 - very satisfied
- 5 - fairly satisfied
- 4 - a little satisfied
- 3 - a little dissatisfied
- 2 - fairly dissatisfied
- 1 - very dissatisfied

14. Whom can you count on to listen openly and uncritically to your innermost feelings?

<table>
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How satisfied?

- 6 - very satisfied
- 5 - fairly satisfied
- 4 - a little satisfied
- 3 - a little dissatisfied
- 2 - fairly dissatisfied
- 1 - very dissatisfied

15. Who will comfort you when you need it by holding you in their arms?

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- 2 - fairly dissatisfied
- 1 - very dissatisfied

16. Whom do you feel would help if a good friend of yours had been in a car accident and was hospitalized in serious condition?

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<td>No one</td>
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How satisfied?

- 6 - very satisfied
- 5 - fairly satisfied
- 4 - a little satisfied
- 3 - a little dissatisfied
- 2 - fairly dissatisfied
- 1 - very dissatisfied

17. Whom can you really count on to help you feel more relaxed when you are under pressure or tense?

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How satisfied?

- 6 - very satisfied
- 5 - fairly satisfied
- 4 - a little satisfied
- 3 - a little dissatisfied
- 2 - fairly dissatisfied
- 1 - very dissatisfied

18. Whom do you feel would help if a family member very close to you died?

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<th>1)</th>
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How satisfied?

- 6 - very satisfied
- 5 - fairly satisfied
- 4 - a little satisfied
- 3 - a little dissatisfied
- 2 - fairly dissatisfied
- 1 - very dissatisfied
19. Who accepts you totally, including both your worst and your best points?

No one 1) 4) 7)
      2) 5) 8)
      3) 6) 9)

How satisfied?
6 - very satisfied 5 - fairly satisfied 4 - a little satisfied 3 - a little dissatisfied 2 - fairly dissatisfied 1 - very dissatisfied

20. Whom can you really count on to care about you, regardless of what is happening to you?

No one 1) 4) 7)
      2) 5) 8)
      3) 6) 9)

How satisfied?
6 - very satisfied 5 - fairly satisfied 4 - a little satisfied 3 - a little dissatisfied 2 - fairly dissatisfied 1 - very dissatisfied

21. Whom can you really count on to listen to you when you are very angry at someone else?

No one 1) 4) 7)
      2) 5) 8)
      3) 6) 9)

How satisfied?
6 - very satisfied 5 - fairly satisfied 4 - a little satisfied 3 - a little dissatisfied 2 - fairly dissatisfied 1 - very dissatisfied

22. Whom can you really count on to tell you, in a thoughtful manner, when you need to improve in some way?

No one 1) 4) 7)
      2) 5) 8)
      3) 6) 9)

How satisfied?
6 - very satisfied 5 - fairly satisfied 4 - a little satisfied 3 - a little dissatisfied 2 - fairly dissatisfied 1 - very dissatisfied

23. Whom can you really count on to help you feel better when you are feeling generally down-in-the-dumps?

No one 1) 4) 7)
      2) 5) 8)
      3) 6) 9)

How satisfied?
6 - very satisfied 5 - fairly satisfied 4 - a little satisfied 3 - a little dissatisfied 2 - fairly dissatisfied 1 - very dissatisfied

24. Whom do you feel truly loves you deeply?

No one 1) 4) 7)
      2) 5) 8)
      3) 6) 9)

How satisfied?
6 - very satisfied 5 - fairly satisfied 4 - a little satisfied 3 - a little dissatisfied 2 - fairly dissatisfied 1 - very dissatisfied

108
25. Whom can you count on to console you when you are very upset?

<table>
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<tr>
<th>No one</th>
<th>1)</th>
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**How satisfied?**

<table>
<thead>
<tr>
<th>6 - very satisfied</th>
<th>5 - fairly satisfied</th>
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26. Whom can you really count on to support you in major decisions you make?

<table>
<thead>
<tr>
<th>No one</th>
<th>1)</th>
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<th>6)</th>
<th>7)</th>
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**How satisfied?**

<table>
<thead>
<tr>
<th>6 - very satisfied</th>
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</table>

27. Whom can you really count on to help you feel better when you are very irritable, ready to get angry at almost anything?

<table>
<thead>
<tr>
<th>No one</th>
<th>1)</th>
<th>2)</th>
<th>3)</th>
<th>4)</th>
<th>5)</th>
<th>6)</th>
<th>7)</th>
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**How satisfied?**

<table>
<thead>
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</tr>
</thead>
</table>
ISEL Scale*

* For clarity, each subscale is listed separately. The scale presented to subjects consists of all 48 items listed in random order. For each scale, the first 6 items are written so that a “true” response indicates support, while for the second 6 items a “false” response indicates support.

Instructions

This scale is made up of a list of statements each of which may or may not be true about you. For each statement we would like you to circle probably True (PT) of the statement is true about you or probably FALSE (PF) if the statement is not true about you.

You may find that many of the statements are neither clearly true nor clearly false. In these cases, try to decide quickly whether probably TRUE (PT) or probably FALSE (PF) is most descriptive of you. Although some questions will be difficult to answer, it is important that you pick one alternative or the other. Remember to circle only one of the alternatives for each statement.

Please read each item quickly but carefully before responding. Remember that this is not a test and there are no right or wrong answers.

Tangible Scale

1. I know someone who would loan me $50 so I could go away for the weekend.
   
   PT          PF

2. I know someone who would give me some old dishes if I moved into my own apartment.
   
   PT          PF

3. I know someone who would loan me $100 to help pay my tuition.
   
   PT          PF

4. If I needed it, my family would provide me with an allowance and spending money.
   
   PT          PF

110
5. If I wanted a date for a party next weekend, I know someone at school or in town who would fix me up.

PT                PF

6. I know someone at school or in town who would bring my meals to my room or apartment if I were sick.

PT                PF

7. I don't know anyone who would loan me several hundred dollars to pay a doctor bill or dental bill.

PT                PF

8. I don't know anyone who would give me some old furniture if I moved into my own apartment.

PT                PF

9. Even if I needed it, my family would (or could) not give me money for tuition and books.

PT                PF

10. I don't know anyone at school or in town who would help me study for an exam by spending several hours reading me questions.

PT                PF

11. I don't know anyone at school or in town who would loan me their car for a couple of hours.

PT                PF

12. I don't know anyone at school or in town who would get assignments for me from my teachers if I was sick.

PT                PF
Belonging Scale

1. There are people at school or in town who I regularly run with, exercise with, or play sports with.
   PT                           PF

2. I hang out in a friend’s room or apartment quite a lot.
   PT                           PF

3. I can get a date who I enjoy spending time with whenever I want.
   PT                           PF

4. If I decided at dinner time to take a study break this evening and go to a movie, I could easily find someone to go with me.
   PT                           PF

5. People hang out in my room or apartment during the day or in the evening.
   PT                           PF

6. I belong to a group at school or in town that meets regularly or does things together regularly.
   PT                           PF

7. I am not a member of any social groups (such as church groups, clubs, teams, etc.).
   PT                           PF

8. Lately, I often feel lonely, like I don’t have anyone to reach out to.
   PT                           PF

9. I don’t have friends at school or in town who would comfort me by showing some physical affection.
   PT                           PF
10. I don't get invited to do things with other people.

PT  PF

11. I don't talk to a member of my family at least once a week.

PT  PF

12. I don't usually spend two evenings on the weekend doing something with others.

PT  PF

**Appraisal Scale**

1. I know someone who I see or talk to often with whom I would feel perfectly comfortable talking about problems I might have budgeting my time between school and my social life.

PT  PF

2. I know someone who I see or talk to often with whom I would feel perfectly comfortable talking about any problems I might have adjusting to college life.

PT  PF

3. I know someone who I see or talk to often with whom I would feel perfectly comfortable talking about sexually transmitted diseases.

PT  PF

4. I know someone who I see or talk to often with whom I would feel perfectly comfortable talking about any problems I might have meeting people.

PT  PF

5. I know someone who I see or talk to often with whom I would feel perfectly comfortable discussing any sexual problems I might have.

PT  PF

113
6. I know someone who I see or talk to often with whom I would feel perfectly comfortable talking about any problems I might have with drugs.

PT  PF

7. There isn't anyone at school or in town with whom I would feel perfectly comfortable talking about any problems I might have making friends.

PT  PF

8. There isn't anyone at school or in town with whom I would feel perfectly comfortable talking about any problems I might have getting along with my parents.

PT  PF

9. There isn't anyone at school or in town with whom I would feel perfectly comfortable talking about difficulties with my social life.

PT  PF

10. There isn't anyone at school or in town with whom I would feel perfectly comfortable talking about my feelings of loneliness and depression.

PT  PF

11. I don't know anyone at school or in town who makes my problems clearer and easier to understand.

PT  PF

12. Lately, when I've been troubled, I keep things to myself.

PT  PF

Self-Esteem Scale

1. Most people who know me well think highly of me.

PT  PF

2. Most of my friends think that I'm smart.

PT  PF

114
3. Most of my friends don't do as well as I do in school.

PT                  PF

4. I will have a better future than most other people will.

PT                  PF

5. Most of my friends have not adjusted to college as easily as I have.

PT                  PF

6. Most people think I have a good sense of humor.

PT                  PF

7. I don't feel friendly with any teaching assistants, professors, campus or student officials.

PT                  PF

8. Most of my friends are more satisfied or happier with themselves than I am.

PT                  PF

9. Most of my friends are more popular than I am.

PT                  PF

10. Most of my friends are more interesting than I am.

PT                  PF

11. Most of my friends have more control over what happens to them than I.

PT                  PF

12. Most people are more attractive than I am.

PT                  PF
<table>
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<tr>
<th></th>
<th>Family Environment Scale</th>
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<tbody>
<tr>
<td>1.</td>
<td>Family members really help and support one another.</td>
<td>YES NO</td>
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<tr>
<td>2.</td>
<td>Family members often keep their feelings to themselves.</td>
<td>YES NO</td>
</tr>
<tr>
<td>3.</td>
<td>We fight a lot in our family.</td>
<td>YES NO</td>
</tr>
<tr>
<td>4.</td>
<td>We don’t do things on our own very often in our family.</td>
<td>YES NO</td>
</tr>
<tr>
<td>5.</td>
<td>We feel it is important to be the best at whatever you do.</td>
<td>YES NO</td>
</tr>
<tr>
<td>6.</td>
<td>We often talk about politics and social problems.</td>
<td>YES NO</td>
</tr>
<tr>
<td>7.</td>
<td>We spend most weekends and evenings at home.</td>
<td>YES NO</td>
</tr>
<tr>
<td>8.</td>
<td>Family members attend church, synagogue, or Sunday School fairly often.</td>
<td>YES NO</td>
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<tr>
<td>9.</td>
<td>Activities in our family are pretty carefully planned.</td>
<td>YES NO</td>
</tr>
<tr>
<td>10.</td>
<td>Family members are rarely ordered around.</td>
<td>YES NO</td>
</tr>
<tr>
<td>11.</td>
<td>We often seem to be killing time at home.</td>
<td>YES NO</td>
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<tr>
<td>12.</td>
<td>We say anything we want to around home.</td>
<td>YES NO</td>
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<tr>
<td>13.</td>
<td>Family members rarely become openly angry.</td>
<td>YES NO</td>
</tr>
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<td>14.</td>
<td>In our family, we are strongly encouraged to be independent.</td>
<td>YES NO</td>
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<tr>
<td>15.</td>
<td>Getting ahead in life is very important in our family.</td>
<td>YES NO</td>
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<tr>
<td>16.</td>
<td>We rarely go to lectures, plays, or concerts.</td>
<td>YES NO</td>
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<tr>
<td>17.</td>
<td>Friends often come over for dinner or to visit.</td>
<td>YES NO</td>
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<td>18.</td>
<td>We don’t say prayers in our family.</td>
<td>YES NO</td>
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<tr>
<td>19.</td>
<td>We are generally very neat and orderly.</td>
<td>YES NO</td>
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<td>20.</td>
<td>There are very few rules to follow in our family.</td>
<td>YES NO</td>
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<tr>
<td>21.</td>
<td>We put a lot of energy into what we do at home.</td>
<td>YES NO</td>
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<tr>
<td>22.</td>
<td>It’s hard to &quot;blow off steam&quot; at home without upsetting somebody.</td>
<td>YES NO</td>
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<tr>
<td>23.</td>
<td>Family members sometimes get so angry they throw things.</td>
<td>YES NO</td>
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<td>24.</td>
<td>We think things out for ourselves in our family.</td>
<td>YES NO</td>
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<tr>
<td>25.</td>
<td>How much money a person makes is not very important to us.</td>
<td>YES NO</td>
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<tr>
<td>26.</td>
<td>Learning about new and different things is very important in our family.</td>
<td>YES NO</td>
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<tr>
<td>27.</td>
<td>Nobody in our family is active in sports, Little League, bowling, etc.</td>
<td>YES NO</td>
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<td>28.</td>
<td>We often talk about the religious meaning of Christmas, Passover, or other holidays.</td>
<td>YES NO</td>
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<td>29.</td>
<td>It’s often hard to find things when you need them in our household.</td>
<td>YES NO</td>
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<td>30.</td>
<td>There is one family member who makes most of the decisions.</td>
<td>YES NO</td>
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<td>31.</td>
<td>There is a feeling of togetherness in our family.</td>
<td>YES NO</td>
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<td>32.</td>
<td>We tell each other about our personal problems.</td>
<td>YES NO</td>
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<tr>
<td>Number</td>
<td>Statement</td>
<td>YES</td>
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<tr>
<td>33.</td>
<td>Family members hardly ever lose their tempers.</td>
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<td>34.</td>
<td>We come and go as we want in our family.</td>
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<td>35.</td>
<td>We believe in competition and &quot;may the best man win.&quot;</td>
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<td>36.</td>
<td>We are not that interested in cultural activities.</td>
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<td>37.</td>
<td>We often go to the movies, sports events, camping, etc.</td>
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<tr>
<td>38.</td>
<td>We don't believe in heaven or hell.</td>
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<td>39.</td>
<td>Being on time is very important in our family.</td>
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<td>40.</td>
<td>There are set ways of doing things at home.</td>
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<td>41.</td>
<td>We rarely volunteer when something has to be done at home.</td>
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<td>42.</td>
<td>If we feel like doing something on the spur of the moment we often just pick up and go.</td>
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<td>43.</td>
<td>Family members often criticize each other.</td>
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<td>44.</td>
<td>There is very little privacy in our family.</td>
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<td>45.</td>
<td>We always strive to do things just a little better the next time.</td>
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<td>46.</td>
<td>We rarely have intellectual discussions.</td>
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<td>47.</td>
<td>Everyone in our family has a hobby or two.</td>
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<td>48.</td>
<td>Family members have strict ideas of what is right and wrong.</td>
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<td>49.</td>
<td>People change their minds often in our family.</td>
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<td>50.</td>
<td>There is a strong emphasis on following rules in our family.</td>
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<td>51.</td>
<td>Family members really back each other up.</td>
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<td>52.</td>
<td>Someone usually gets upset if you complain in our family.</td>
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<td>53.</td>
<td>Family members sometimes hit each other.</td>
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<td>54.</td>
<td>Family members almost always rely on themselves when a problem comes up.</td>
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<tr>
<td>55.</td>
<td>Family members rarely worry about job promotions, school, grades, etc.</td>
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<tr>
<td>56.</td>
<td>Someone in our family plays a musical instrument.</td>
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<td>57.</td>
<td>Family members are not very involved in recreational activities outside work or school.</td>
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<td>58.</td>
<td>We believe there are some things you just have to take on faith.</td>
<td></td>
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<tr>
<td>59.</td>
<td>Family members make sure their rooms are neat.</td>
<td></td>
</tr>
<tr>
<td>60.</td>
<td>Everyone has an equal say in family decisions.</td>
<td></td>
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<tr>
<td>61.</td>
<td>There is very little group spirit in our family.</td>
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<tr>
<td>62.</td>
<td>Money and paying bills is openly talked about in our family.</td>
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<tr>
<td>63.</td>
<td>If there's a disagreement in our family, we try hard to smooth things over and keep the peace.</td>
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<tr>
<td>64.</td>
<td>Family members are strongly encourage each other to stand up for their rights.</td>
<td>Yes</td>
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</tr>
<tr>
<td>65.</td>
<td>In our family, we don't try that hard to succeed.</td>
<td>Yes</td>
</tr>
<tr>
<td>66.</td>
<td>Family members often go to the library.</td>
<td>Yes</td>
</tr>
<tr>
<td>67.</td>
<td>Family members sometimes attend courses or take lessons for some hobby or interest (outside of school).</td>
<td>Yes</td>
</tr>
<tr>
<td>68.</td>
<td>In our family each person has different ideas about what is right and wrong.</td>
<td>Yes</td>
</tr>
<tr>
<td>69.</td>
<td>Each person's duties are clearly defined in our family.</td>
<td>Yes</td>
</tr>
<tr>
<td>70.</td>
<td>We can do whatever we want to in our family.</td>
<td>Yes</td>
</tr>
<tr>
<td>71.</td>
<td>We really get along well with each other.</td>
<td>Yes</td>
</tr>
<tr>
<td>72.</td>
<td>We are usually careful about what we say to each other.</td>
<td>Yes</td>
</tr>
<tr>
<td>73.</td>
<td>Family members often try to one-up or out-do each other.</td>
<td>Yes</td>
</tr>
<tr>
<td>74.</td>
<td>It's hard to be by yourself without hurting someone's feelings in our household.</td>
<td>Yes</td>
</tr>
<tr>
<td>75.</td>
<td>&quot;Work before play&quot; is the rule in our family.</td>
<td>Yes</td>
</tr>
<tr>
<td>76.</td>
<td>Watching T.V. is more important than reading in our family.</td>
<td>Yes</td>
</tr>
<tr>
<td>77.</td>
<td>Family members go out a lot.</td>
<td>Yes</td>
</tr>
<tr>
<td>78.</td>
<td>The Bible is a very important book in our home.</td>
<td>Yes</td>
</tr>
<tr>
<td>79.</td>
<td>Money is not handled very carefully in our family.</td>
<td>Yes</td>
</tr>
<tr>
<td>80.</td>
<td>Rules are pretty inflexible in our household.</td>
<td>Yes</td>
</tr>
<tr>
<td>81.</td>
<td>There is plenty of time and attention for everyone in our family.</td>
<td>Yes</td>
</tr>
<tr>
<td>82.</td>
<td>There are a lot of spontaneous discussions in our family.</td>
<td>Yes</td>
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<td>83.</td>
<td>In our family, we believe you don't ever get anywhere by raising your voice.</td>
<td>Yes</td>
</tr>
<tr>
<td>84.</td>
<td>We are not really encouraged to speak up for ourselves in our family.</td>
<td>Yes</td>
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<td>85.</td>
<td>Family members are often compared with others as to how well they are doing at work or school.</td>
<td>Yes</td>
</tr>
<tr>
<td>86.</td>
<td>Family members really like music, art, and literature.</td>
<td>Yes</td>
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<tr>
<td>87.</td>
<td>Our main form of entertainment is watching T.V. or listening to the radio.</td>
<td>Yes</td>
</tr>
<tr>
<td>88.</td>
<td>Family members believe that if you sin you will be punished.</td>
<td>Yes</td>
</tr>
<tr>
<td>89.</td>
<td>Dishes are usually done immediately after eating.</td>
<td>Yes</td>
</tr>
<tr>
<td>90.</td>
<td>You can't get away with much in our family.</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Medical History Questionnaire

Date: _________ Protocol #:___________

Date of Birth: _____/____/______ Age:____

Sex: Male Female

Height: _____’____” Weight: ____#

Do you smoke cigarettes? yes no

Which of the following do you consider to be your racial or ethnic origin? (please circle only one)

Caucasian Asian-American Native-American
African-American Hispanic-American Other (specify):__________

On the lines below, please list the members of your family household and their ages. Do not give their names, just list their relationship to you (e.g., father, mother, sister, brother, etc.):

<table>
<thead>
<tr>
<th>Relationship of Family Member</th>
<th>Age</th>
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</tbody>
</table>

Are you living at home with your family while you are in school? yes no
Please indicate if you have experienced any of the following by placing the correct number on the line to the right of each question.

0 = NO  1 = YES  2 = DON'T KNOW

Answer these questions as they apply to yourself:

1. Heart attack. ___
   10. Thyroid disease. ___
2. Angina pectoris (chest pain). ___
   11. Arthritis. ___
3. Other heart disease. ___
   12. Colitis. ___
4. High blood pressure. ___
   13. Ulcer. ___
5. Elevated cholesterol. ___
   14. Migraine. ___
6. Diabetes. ___
   15. Asthma. ___
7. Kidney disease. ___
   16. Hayfever. ___
8. Stroke. ___
   17. Other (specify): _________________
9. Cancer. ___

Please indicate if your biological father has experienced any of the following by placing the correct number on the line to the right of each question.

0 = NO  1 = YES  2 = DON'T KNOW

Answer these questions as they apply to your biological father:

1. Heart attack. ___
   If yes, how old was your father when it occurred? ___
   How old were you when it occurred? ___
2. Coronary artery bypass graft surgery. ___
   If yes, how old was your father when it occurred? ___
   How old were you when it occurred? ___
3. Coronary angioplasty. ___
   If yes, how old was your father when it occurred? ___
   How old were you when it occurred? ___

120
0 = NO 1 = YES 2 = DON'T KNOW

Answer these questions as they apply to your biological father:

4. Coronary death. _____________
   If yes, how old was your father when it occurred? _____________
   How old were you when it occurred? _____________

5. Angina pectoris (chest pain). _____________
6. Other heart disease. _____________
7. High blood pressure. _____________
8. Elevated cholesterol. _____________
9. Diabetes. _____________
10. Kidney disease. _____________
11. Stroke. _____________
12. Cancer. _____________
13. Thyroid disease. _____________
14. Arthritis. _____________
15. Colitis. _____________
16. Ulcer. _____________
17. Migraine. _____________
18. Asthma. _____________
19. Hayfever. _____________
20. Other (specify): _____________

Please indicate if your biological mother has experienced any of the following by placing the correct number on the line to the right of each question.

0 = NO 1 = YES 2 = DON'T KNOW

Answer these questions as they apply to your biological mother:

1. Heart attack. _____________
   If yes, how old was your mother when it occurred? _____________
   How old were you when it occurred? _____________

2. Coronary artery bypass graft surgery. _____________
   If yes, how old was your mother when it occurred? _____________
   How old were you when it occurred? _____________
0 = NO  1 = YES  2 = DON'T KNOW

Answer these questions as they apply to your biological mother:

3. Coronary angioplasty.  
If yes, how old was your mother when it occurred?  
How old were you when it occurred?

If yes, how old was your mother when it occurred?  
How old were you when it occurred?

5. Angina pectoris (chest pain).  
6. Other heart disease.  
7. High blood pressure.  
8. Elevated cholesterol.  
13. Thyroid disease.  
15. Colitis.  
16. Ulcer.  
17. Migraine.  
18. Asthma.  
20. Other (specify):____________________
Please answer the following questions only if your biological parent experienced a heart attack, coronary artery bypass graft surgery, coronary angioplasty, or coronary death. Using the scale below, read each question and give your answer on the line to the right.

1  2  3  4  5
Very Negative  Somewhat Negative  No Effect  Somewhat Positive  Very Positive

1. What effect, if any, has your parent’s heart disease had on your mood? ___
2. What effect, if any, has your parent’s heart disease had on your family relationships? ___
3. What effect, if any, has your parent’s heart disease had on your level of activity? ___
4. What effect, if any, has your parent’s heart disease had on his/her mood? ___
5. What effect, if any, has your parent’s heart disease had on his/her family relationships? ___
6. What effect, if any, has your parent’s heart disease had on his/her level of activity? ___