

PERSONALITY AND BREAST CANCER SCREENING BEHAVIORS¹

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ABSTRACT

This review examines findings on the relationship between personality and breast cancer screening behaviors. Because the literature is limited, data from the University of North Carolina Alumni Heart Study (UNCAHS) are presented showing the associations between personality measured by the NEO Personality Inventory (NEO-PI) and mammography and breast self-examination.

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INTRODUCTION

The purpose of this article is to evaluate the state of knowledge about personality factors in understanding breast cancer screening behaviors. While the literature on mammography and personality is limited, it has the potential to be important in helping to target interventions to individuals with specific personality patterns. For example, extraverts could be expected to respond to a group setting, whereas introverts would be more likely to respond to an individualized message. Most of the literature on mammography is concerned with identifying barriers and developing interventions to overcome them (1) and uses theoretical perspectives ranging from the Health Belief Model (2) to the Transtheoretical Model to explain health-related behaviors and behavior change (3).

Numerous surveys of women and physicians have now confirmed a number of barriers to mammography. Physicians are most likely to cite cost as the reason why women do not get regular mammograms (4). Women give different reasons when they are asked why they have not had mammograms. Women say they did not get mammograms because their doctors did not recommend them, they did not need them, because it was not necessary, or there was no problem (5-10). Other barriers such as cost, fear of the result, concerns about pain and embarrassment, and procrastination are less frequently mentioned.

Most studies show that mammography use is higher among women with 13 or more years of education, those with incomes above \$30,000 (1), and those with insurance and a regular source of health care (11). Women who make regular visits to their

gynecologists are more likely to get mammograms (12), as are women who get regular checkups and are non-smokers (1,10,13). Women are also more likely to get mammograms if they know the guidelines and recognize that the risk of breast cancer increases with age (14). The role of perceived personal risk has been inconsistent: some authors report this to be a facilitator (15,16); others have not (17).

The study of women's beliefs, knowledge, and socio-demographic characteristics and their associations with patterns of mammography has generally produced a set of consistent results except for the role of family history. However, the role of personality factors has not been fully examined (see 18). Personality is a stable individual difference variable—an enduring disposition—which reflects how an individual describes herself and is described by others, often in terms of traits (19). John (20) defined personality as “consistent stable modes of an individual's adjustment.” The main personality associations with cancer have been in depression, social support, helplessness, hopelessness, and the lack of expression of emotion (21-24).

In general, investigations of breast cancer screening have not utilized personality constructs to explain their findings or to suggest new intervention strategies. Personality theorists have been interested in the role of stability and change in adult development and in the role that personality plays in disease incidence. However, once the biological factors have been accounted for in carefully controlled studies, personality has yet to emerge as an independent risk factor for breast cancer (25). Thus, attention to the role of personality in understanding cancer screening is only beginning. From a behavioral point of view, more attention has focused on stress and cancer (26,27), stress and the immune system (e.g. 28-30), coping with cancer (31), or coping with the results of a false positive mammogram (32,33).

There have been consistent associations of personality factors predicting important health promoting and health damaging behaviors (34,35). While personality may or may not be causally related to cancer incidence [see (25) for review], personality characteristics could be expected to be related to screening behaviors (21). Smoking and alcohol use are two well-studied behavioral risk factors with personality associations. However, the literature relating breast cancer to these behavioral risk factors has been inconsistent to date for both alcohol (36) and for smoking (37). The literature on personality correlates of obesity and eating a high-fat diet—two additional behavioral risk factors that have been associated with breast cancer (38)—is less well-researched. While there is reason to believe that personality would be related to breast cancer screening behavior, few researchers have used personality measures, as this review will demonstrate.

THE LITERATURE ON PERSONALITY AND BREAST SCREENING

An exhaustive search of bibliographic data bases identified only four relevant papers. Morris and Greer (39) invited all new

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patients attending a breast screening clinic during a calendar year to complete the Neuroticism, Extraversion, and Lie scales from the Eysenck Personality Questionnaire (40), and the Spielberg State-Trait Anxiety Inventory. The final sample included 433 women with benign breast disease and 369 women with normal breasts. These two groups were not different on age, marital status, or social class. Scores on Neuroticism and Extraversion were similar between the two groups and comparable to norms for the British population of the same age. The Lie score was higher for the benign disease patients, but it was found not to have influenced the N scores. There were no group differences on trait anxiety but higher state anxiety scores for the benign disease group. The authors interpreted their results to mean that a rational appraisal of risk (rather than psychological factors) accounts for breast screening.

Maclean et al. (41) studied 125 women aged 45-64 who declined to attend breast screening in Edinburgh. The attitudes toward screening suggested that practical reasons were the most prevalent (45.6%) and fears, worries, and anxieties (39.2%) were the second most common reasons for non-attendance. The percentage endorsing fears and worries was inversely related to social class with only 20% of the women in the professional and intermediate class, 23% skilled non-manual, 52.6% skilled-manual, and 52.9% semiskilled and unskilled manual laborers endorsing fears and worries as a reason for non-attendance. Some of the fears appeared to be knowledge-related; but the implication of the results is that psychological factors may be an additional barrier for those from lower social classes. A similar conclusion on breast cancer worries was reached by Lerman et al. (42) in their study of women at high risk of breast cancer due to their family history.

Kreitler, Chaitchik, and Kreitler (43) drew their experimental sample from breast-screening clinics of the Israeli National Cancer Association (the exam is free and physician referral is not necessary). The sample included 210 experimental subjects (women who attended the clinic) compared with 210 women controls who were matched on demographic variables. All the control women had heard of the breast cancer screening opportunity, but had not participated. Each woman completed a random five of ten psychological questionnaires and a background information questionnaire. Because the numbers of respondents were not given in the tables, it is hard to evaluate whether the amount of missing data on psychological factors differed between the attenders and the non-attenders. This definition of screening does not speak to those who have ever versus never had a mammogram, nor to the pattern of mammography. In discussing the reasons given for attending, 19.5% of the sample went because they were on a self-imposed adherence schedule, such as once per year. The two samples were compared on 83 variables with significant differences on 50 of them; 18 of those 50 variables were noted to be significant at $p < .001$ level. The attenders were higher on emotional responses and the personality trait of repression (defined as high defensiveness and low anxiety). They reported a cognitively restricted self-concept for attenders. Attenders were also lower on neuroticism and lower on psychosomatic symptoms, but higher on alexithymia—a trait indexing low emotionality ($p = .05$).

The authors interpreted their findings as indicating three foci: (a) a salience of dysphoric emotions; (b) psychological disease promotion; and (c) defensiveness, that are "consistent with the cancer-prone personality consisting of a repressive style, suppressed emotion, and tendency towards dysphoria—es-

pecially hopelessness and depression" (43, p. 1184). However, it is difficult from the data presented in the paper to verify the accuracy of their conclusions.

Fallowfield, Rodway, and Baum (44) asked a most relevant question in the title of their paper: What are the psychological factors influencing attendance, non-attendance, and re-attendance at a breast screening centre? However, there were no psychological measures employed as part of the questionnaire packet. Thus, while their paper does not add to our knowledge of the role of anxiety as a personality factor in mammography, it does provide some interesting results about the difficulties of getting data from an inner-city population and the problems of differential response rates from adherent (94%) versus non-adherent (11.5%) populations. Discussion of the responses from the non-adherent women suggested that the women didn't want to know if they had cancer and preferred not to think about it.

These studies have been reviewed because they illustrate the problems of researching the topic. These problems include difficulty in defining an appropriate control group, attention to the pattern of mammography behavior, and the use of attendance at a particular clinic at a particular time as the most appropriate outcome variable. The measurement of personality was also highly variable, ranging from well-known standardized tests to newly developed questions. However, none of the studies suggested that personological factors were key to understanding mammography screening behaviors.

Our own work in this area started because: (a) it was a relatively unexplored area of mammography research, and (b) we had a strong interest in understanding the role of personality in disease as it might operate through risky behaviors (45,46). Because we already had an ongoing prospective study of personality and coronary heart disease, it was a relatively simple matter to add some questions about mammography behavior as an intermediate outcome to studying breast cancer in this cohort. Furthermore, the prospective design of our study allowed for the measurement of personality in everyone independent of their mammography behavior. Adult personality was measured at two time periods in the University of North Carolina Alumni Heart Study (UNCAHS) as the instrument we used, the NEO Personality Inventory (NEO-PI) (47), was revised to include facets scales for the domains of Agreeableness and Conscientiousness (48).

Siegler, Feaganes, and Rimer (49) analyzed data from a specially designed Women's Health Questionnaire that was added to the UNCAHS in order to evaluate mammography as a health behavior. The UNCAHS is designed to evaluate personality as a predictor of coronary heart disease (CHD) and CHD risk factors. In the women aged 40-50, we found that 89.5% had one or more mammograms. However, a reading of the questionnaires of the 89 women who had never had a mammogram suggested two types of persons from the handwritten comments: (a) those who did not believe in medicine or highly technical medicine; and (b) those who did not choose to spend their own money on mammograms and did not have insurance coverage, even in this relatively well-educated sample.

Data from the NEO Personality Inventory (47) measured in 1988 were used to predict adoption of mammography in 756 women. The women had a mean age of 44.2, were well-educated (only 10% lacked a college degree), 76% were married, 58% were working full-time, 23% were working part-time, and they had a median family income around \$60,000 per year.

TABLE 1

NEO Personality Inventory Revised and Mammography Behavior (Ever versus Never) Breast Self-Examination (None, Casual versus Thorough) and Joint Screening Behaviors in the Women in the UNC Alumni Heart Study

Personality Factors	+		F, p	Casual			F, p	-MAMO -MAMO MAMO				F, p
	MAMO	MAMO		No BSE	BSE	Full BSE		-BSE	+BSE	No BSE	Both	
	N = 575	N = 59		N = 103	N = 387	N = 138		N = 40	N = 19	N = 459	N = 119	
N-Neuroticism				52.6	51.4	48.7	4.70, .009	51.2	48.2	51.7	48.8	2.82, .04
N1-Anxiety				50.2	51.5	48.5	4.35, .01	49.0	47.1	51.4	48.8	3.33, .02
N4-Self-Consciousness				52.7	50.4	48.9	3.97, .02					
N6-Vulnerability				51.1	50.1	47.4	4.87, .008	50.4	47.2	50.3	47.4	3.00, .03
E-Extraversion				47.6	49.5	51.6	4.58, .01	45.9	50.7	49.4	51.8	3.69, .01
E1-Warmth	49.5	45.9	6.11, .01					45.0	47.8	49.0	51.2	3.69, .01
E2-Gregariousness	47.9	44.6	4.68, .03					43.0	48.1	47.6	49.2	3.13, .03
E3-Assertiveness				50.5	52.7	54.7	4.78, .008					
O4-Open/Actions				49.2	51.7	52.7	3.95, .02					
O5-Open/Ideas	52.3	55.7	6.30, .01									
A1-Trust				49.3	51.5	52.5	3.95, .02					
C-Conscientiousness				48.9	50.5	53.3	6.19, .002	48.2	49.9	50.3	53.9	4.79, .003
C1-Competence	54.5	51.2	5.30, .02	52.5	53.8	56.3	4.29, .014	50.6	52.5	53.8	56.9	4.60, .003
C4-Achievement Striving				46.7	49.4	51.8	6.89, .001	48.3	52.4	48.9	51.7	2.79, .04
C5-Self-Discipline	48.5	45.1	4.51, .03	46.8	47.4	51.3	6.59, .001	44.3	46.8	47.5	51.9	6.47, .003

Note: There were no significant relationships for the Domains and Facets that are not listed in the Table: N2, N3, N5, E4, E5, E6, O, O1, O2, O3, O6, A, A2, A3, A4, A5, A6, C2, C3, C6.

Ordinal logistic regression was used to predict a four-stage adoption of the mammography model developed by Rakowski and his colleagues (50). This model combined history of mammography with future intention. Our findings indicated that a ten-point increase (approximately one standard deviation) in the personality domains of Conscientiousness (C) and Extraversion (E) were associated with adoption of a more adherent regimen. The odds ratios for C and E were 1.64 (1.2, 2.23) and 1.44 (1.05, 1.97), respectively. The Depression facet of Neuroticism was associated with a less adherent regimen with an odds ratio of .73 (.50, .77), indicating that the more depressed women were less likely to adopt an adherent pattern. When these coefficients were adjusted for eight factors known to explain mammography behavior (e.g. knowledge of the recommended schedule for women aged 40-49, prevalence of breast cancer, estimate of personal risk, cost, insurance coverage, family history, number of friends with breast cancer, schedule of obstetrics-gynecology visit), the odds ratios were reduced and failed to maintain statistical significance for Conscientiousness to 1.44 (.99, 2.12) and for Depression .69 (.47, 1.00). Anxiety was not a significant predictor of adoption of mammography (OR = 1.26; CI = .92; 1.19). When the analysis was adjusted for the other factors, the coefficient changed direction OR = .69 and the confidence interval approached significance CI = .47, 1.00.

Adoption of mammography is a complex dependent variable developed to study models of health behavior. There is reason to expect that personality will predict behavior; but it is less likely that personality will predict a combination of past behaviors and future intentions. The measures of Neuroticism and Extraversion on the NEO-PI are quite similar to the domains of the same name form the Eysenck Personality Questionnaire (51). Thus, it is interesting that in comparison to the Morris and Greer findings, Extraversion was predictive of mammography behavior.

PRELIMINARY ANALYSES FROM UNCAHS

Because the data on the personality associations with breast screening behaviors are so limited, we present additional data

from the UNC Alumni Heart Study women who reported on their mammography and breast self-examination (BSE) behavior in 1991. The data in Table 1 are based on the responses of 634 women—all of the women who had complete data on the variables of interest (mammography behavior and both parts of the NEO Personality Inventory which were combined and scored as the NEO-PIR). The NEO-PIR (48) included items that measured six facets for each of the domains of Agreeableness and Conscientiousness. These additional 74 items were collected at the same time as the mammography information.

For this group of 634 women, 90.7% had at least one mammogram, 21.8% did a thorough breast self-examination, and 18.76% reported that they did both. When the screening behaviors were combined, "none" and "casual" were treated as no BSE.

Because the data are not normally distributed, we used the non-parametric analysis of variance to evaluate mean differences on personality factors (52). All five domains of the NEO and all 30 facets were tested.

First, there are more personality associations with breast self-examination than with mammography (MAMO). Women who reported never having had a mammogram described themselves as lower in Warmth (E1), Gregariousness (E2), Competence (C5), and Self-discipline (C6), and counterintuitively more open to ideas (O4). There is a very different psychological picture when considering breast self-examination: Women who do a full BSE are lowest on Neuroticism (N) and the facets of Anxiety (N1), Self-consciousness (N4), and Vulnerability (N6). Assertiveness (E3) is highest in full BSE, intermediate in casual BSE, and the lowest in no BSE. Agreeableness (A), overall Conscientiousness (C), and the facets of Competence (C1), Achievement striving (C4), and Self-discipline (C5) show the same pattern of results. The mean levels for the casual BSE are intermediate for all contrasts. Thus, the woman who does not do BSE is more neurotic, introverted, less assertive, closed to actions, and less conscientious. Neuroticism (N) is equivalent in women who practice BSE but differs in mammography experience. These women are lower in N than those who do not practice BSE independent of mammography behaviors. More-

over, women who use both strategies are highest in Conscientiousness (C) and the facets of Competence (C1) and Self-discipline (C5).

As the UNC Alumni Heart Study continues, it will be valuable to track the fate of these different women in terms of their patterns of health behaviors, disease incidence, and eventually cause-specific mortality. Only prospective long-term studies that have valid and reliable measures of personality, screening behaviors, and risk factors that pay the same degree of attention to the verification of disease outcomes will be able to provide answers to the questions about the role of personality factors and coping in breast cancer screening.

SUMMARY AND CONCLUSIONS

The literature on personality factors and mammography is limited. Current, pressing policy concerns about the appropriate recommendations for women under 50, the cost-effectiveness of screening, and the problems in reducing financial and attitudinal barriers for disadvantaged women would appear to give low priority to such research. This may be shortsighted, as there is evidence that psychological factors might play a role in helping to better target intervention messages across the socioeconomic ladder. Perhaps the most effective strategy is to encourage the add-on of information about mammography to ongoing prospective studies with personality data already collected. In addition, the follow-ups of such studies could be encouraged to include a careful assessment of cancer morbidity and mortality, and to add a set of psychological indicators. As more and more studies include women and concerns about women's health, the data should become available to evaluate the role of personality as a factor in mammography behavior.

REFERENCES

- (1) Rimer BK: Understanding the acceptance of mammography by women. *Annals of Behavioral Medicine*. 1992, 14:197-203.
- (2) Rosenstock IM: The Health Belief Model: Explaining health behavior through expectancies. In Glanz K, Lewis FM, Rimer BK (eds), *Health Behavior and Health Education: Theory, Research, and Practice*. San Francisco, CA: Jossey-Bass, 1990, 39-62.
- (3) Proschaka JO, DiClemente CC: *The Transtheoretical Approach: Crossing Traditional Boundaries of Therapy*. Chicago, IL: Dow Jones/Irwin, 1984.
- (4) American Cancer Society: *Survey of Physicians' Attitudes and Practices in Early Cancer Detection*. Atlanta, GA: American Cancer Society, 1989.
- (5) Dawson DA, Thompson GB: Breast cancer risk: Factors and screening: United States, 1987. *Vital and Health Statistics, Series 10, No. 172*. DHHS Pub. No. 90-1500. Hyattsville, MD: National Center for Health Statistics, 1990.
- (6) Fox S, Stein JA: The effect of physician-patient communication on mammography utilization by different ethnic groups. *Medical Care*. 1991, 29:1065-1082.
- (7) Lane DS, Polednak AP, Burg MA: Does breast cancer screening differ between users of county funded health centers and women in the entire community? *American Journal of Public Health*. 1992, 82:199-203.
- (8) Harris RP, Fletcher SW, Gonzalez JJ, et al: Mammography and age: Are we targeting the wrong women? A community survey of women and physicians. *Cancer*. 1991, 67:2010-2014.
- (9) NCI Breast Cancer Screening Consortium: Screening mammography: A missed clinical opportunity? *Journal of the American Medical Association*. 1990, 264:54-58.
- (10) Zapka JG, Stoddard A, Maul K, Costanza ME: Internal adherence to mammography screening guidelines. *Medical Care*. 1991, 29:697-707.
- (11) Rakowski W, Rimer BK, Bryant SA: Integrating behavior and intention for the study of mammography: Data from the 1990 supplement to the National Health Interview Survey. *Public Health Reports*. 1993, 108:605-624.
- (12) Burg MA, Lane DS: Mammography referrals for elderly women: Is Medicare reimbursement likely to make a difference? *Health Service Research*. 1992, 7:505-516.
- (13) Hayward RA, Shapiro MF, Freeman HE, Corey CR: Who gets screened for cervical and breast cancer? *Archives of Internal Medicine*. 1988, 148:1177-1181.
- (14) Rimer BK, Trock B, Engstrom PF, Lerman C, King E: Why do some women get regular mammograms? *American Journal of Preventive Medicine*. 1991, 7:69-74.
- (15) Rimer BK: The role of theory in improving primary care practice. In Grady ML (ed), *Conference Proceedings AHCP Primary Care Research: Theory and Methods*. 1991, 183-188.
- (16) Taplin SH, Montano DC: Attitudes, age, and participation in mammographic screening: A prospective analysis. *Journal of the American Board of Family Practice*. 1993, 6:13-23.
- (17) Vogel VG, Graves DS, Vernon SW, et al: Mammographic screening of women with increased risk of breast cancer. *Cancer*. 1990, 66:1613-1620.
- (18) Levy SM: *Behavior and Cancer: Lifestyle and Psychosocial Factors in the Initiation and Progression of Cancer*. San Francisco, CA: Jossey-Bass, 1985.
- (19) McCrae RR, Costa PT: *Personality in Adulthood*. New York: Guilford Press, 1990.
- (20) John OP: The "Big five" factor taxonomy: Dimensions of personality in the natural language and in questionnaires. In Pervin LA (ed), *Handbook of Personality*. New York: Guilford Press, 1990, 66-100.
- (21) Contrada RJ, Leventhal H, O'Leary A: Personality and health. In Pervin LA (ed), *Handbook of Personality: Theory and Research*. New York: Guilford Press, 1990, 638-669.
- (22) Eysenck HJ: Personality, stress, and cancer: Prediction and prophylaxis. *British Journal of Medical Psychology*. 1988, 61:57-75.
- (23) Eysenck HJ: Personality and stress as causal factors in cancer and coronary heart disease. In Janisse MP (ed), *Individual Differences, Stress, and Health Psychology*. New York: Springer-Verlag, 1988, 129-145.
- (24) Temoshok L: On attempting to articulate the biopsychological model: Psychological-psychophysiological homeostasis. In Friedman HS (ed), *Personality and Disease*. New York: John Wiley & Sons, 1990, 203-225.
- (25) Holland JC: Behavioral and psychosocial risk factors in cancer: Human studies. In Holland JC, Rowland JH (eds), *Handbook of Psychooncology*. New York: Oxford University Press, 1989, 705-726.
- (26) Cooper CL (ed): *Psychosocial Stress and Cancer*. Chichester, U.K.: John Wiley & Sons, 1984.
- (27) Cooper CL, Watson M: *Cancer and Stress: Psychological, Biological, and Coping Studies*. Chichester, U.K.: John Wiley & Sons, 1991.
- (28) Anderson BL, Kieclot-Glaser JK, Glaser R: A biobehavioral model of cancer stress and disease course. *American Psychologist*. 1994, 49:389-404.
- (29) O'Leary A: Stress, emotion, and human immune function. *Psychological Bulletin*. 1990, 108(3):363-382.
- (30) Levy SM, Heiden LA: Personality and social factors in cancer outcome. In Friedman HS (ed), *Personality and Disease*. New York: John Wiley & Sons, 1990, 254-279.
- (31) Rowland JH: Intrapersonal resources: Coping. In Holland JC, Rowland JH (eds), *Handbook of Psychooncology*. New York: Oxford University Press, 1989, 44-57.
- (32) Lerman C, Trock B, Rimer BK, et al: Psychological and behavioral implications of abnormal mammograms. *Annals of Internal Medicine*. 1991, 114(8):657-661.

- (33) Lerman C, Trock B, Rimer BK, et al: Psychological side effects of breast cancer screening. *Health Psychology*. 1991, 10(4):259-267.
- (34) Kaplan GA: Psychosocial aspects of chronic illness: Direct and indirect associations with ischemic heart disease mortality. In Kaplan RM, Criqui MH (eds), *Behavioral Epidemiology and Disease Prevention*. New York: Plenum Press, 1985, 237-270.
- (35) Booth-Kewley S, Vickers RR: Associations between major domains of personality and health behavior. *Naval Health Research Center Report No. 91-34*. San Diego, CA: Naval Health Research Center, 1991.
- (36) Rosenberg L, Metzger LS, Palmer JR: Alcohol consumption and risk of breast cancer: A review of the epidemiologic evidence. *Epidemiologic Reviews*. 1993, 15:133-144.
- (37) Palmer JR, Rosenberg L: Cigarette smoking and the risk of breast cancer. *Epidemiologic Reviews*. 1993, 15:145-146.
- (38) Rowland JH, Holland JC: Breast cancer. In Holland JC, Rowland JH (eds), *Handbook of Psychooncology*. New York: Oxford University Press, 1989, 188-207.
- (39) Morris T, Greer S: Psychological characteristics of women electing to attend a breast screening clinic. *Clinical Oncology*. 1982, 8:113-119.
- (40) Eysenck HJ, Eysenck SBG: *Manual of the Eysenck Personality Questionnaire*. San Diego, CA: EdITS, 1975.
- (41) Maclean U, Sinfield D, Klein S, Harnden B: Women who decline breast screening. *Journal of Epidemiology and Community Health*. 1984, 38:278-283.
- (42) Lerman C, Daly M, Sands C, et al: Mammography adherence and psychological distress among women at risk for breast cancer. *Journal of the National Cancer Institute*. 1993, 85:1074-1080.
- (43) Kreitler S, Chaitchik S, Kreitler H: The psychological profile of women attending breast screening tests. *Social Science in Medicine*. 1990, 31:1177-1185.
- (44) Fallowfield LJ, Rodway A, Baum M: What are the psychological factors influencing attendance, non-attendance, and re-attendance at a breast screening centre? *Journal of the Royal Society of Medicine*. 1990, 83:547-551.
- (45) Siegler IC, Peterson BL, Barefoot JC, Williams RB: Hostility during late adolescence predicts coronary risk factors at midlife. *American Journal of Epidemiology*. 1992, 138(2):146-154.
- (46) Siegler IC: Hostility and risk: Demographic and lifestyle variables. In Siegman AW, Smith TW (eds), *Anger, Hostility, and the Heart*. Hillsdale, NJ: Lawrence A. Erlbaum, 1994, 199-214.
- (47) Costa PT, McCrae RR: *The Neo-PI*. Odessa, FL: Psychological Assessment Resources, 1985.
- (48) Costa PT, McCrae RR: *Neo-PIR Professional Manual*. Odessa, FL: Psychological Assessment Resources, 1992.
- (49) Siegler IC, Feaganes JR, Rimer BR: Adoption of mammography in women under age 50. Unpublished Manuscript, Duke University, 1994.
- (50) Rakowski W, Dube CE, Marcus BH, et al: Assessing elements of women's decisions about mammography. *Health Psychology*. 1992, 11(2):111-118.
- (51) McCrae RR, Costa PT: Comparison of the EPI and Psychoticism scales with measures of the five-factor model of personality. *Personality and Individual Differences*. 1985, 6:587-597.
- (52) *SAS/STAT User's Guide, Version 6 (4th Ed.) (Vol. 2)*. Cary, NC: SAS Institute Inc., 1990.