2006

Advanced registered nurse practitioners' judgments of coronary heart disease risk

Kelly D. Stamp
University of South Florida

Advanced Registered Nurse Practitioners' Judgments of Coronary Heart Disease Risk

by

Kelly D. Stamp

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
Department of Health Sciences Center
College of Nursing
University of South Florida

Major Professor: Mary Webb, Ph.D., RN
Major Co-Professor: Mary Evans, Ph.D., RN
Jason Beckstead, Ph.D.
Carol Bryant, Ph.D., MPH

November 1, 2006

Key Words: decision-making, Social Judgment Theory, clinical assessment, nursing, patients

To my husband Tim…

for always being there to encourage, support, and believe in me…

for telling me to keep my dreams alive…to know that achievement of anything requires

faith and belief in yourself, vision, hard work, determination, and dedication.

Always remembering…anything is possible.

Acknowledgements

I wish to acknowledge the dissertation committee members with appreciation and gratitude.

Dr. Mary Webb, Dissertation Chair, for her support, encouragement, and guidance from the development to the completion of the project. It has been a privilege to perform research under her direction.

Dr. Mary Evans, Co-Dissertation Chair, for her research expertise and contribution; her thoughtful review of my manuscript and her willingness to participate on the committee in spite of her extremely busy schedule. She is a great role model of the nurse scientist.

Dr. Jason Beckstead for his statistical expertise, guidance, and patience throughout the pilot and dissertation study along with defense preparation. He remained available for all of my questions and provided encouragement during frustrating times.

Dr. Carol Bryant for her support, encouragement, and public health perspective; she made herself readily available for committee meetings and manuscript reviews.

It is with my great pleasure to recognize and thank the members of my committee for their availability and willingness to accommodate my questions, edits, and meetings. They have provided scholarly expertise and research mentorship while making the ride to doctoral preparation challenging and enjoyable.

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ABSTRACT

Coronary heart disease (CHD) is the single largest killer of American males and females in the United States. According to the American Heart Association, (2005) approximately 41% of Americans that experience a coronary attack in a given year will die from it (AHA, 2005). To combat this growing problem, strategies need to be evaluated to assess how the identification of actual and potential CHD risks are made. This study utilized the Social Judgment Theory to gain insight into nurse practitioner's decision-making strategies.

Sixty family or adult specialty nurse practitioners affiliated with the University of South Florida (USF) College of Nursing volunteered to take part in a pretest-posttest experimental design. They were randomly assigned to one of three conditions. Condition 1 and 2 received educational interventions and Condition 3 served as the control group, which received no education. This design was used to assess the effects of educational feedback on improving judgment accuracy, achievement, and insight.

The findings indicated nurse practitioners agreement with the Framingham prediction model of CHD risk did improve significantly for the two intervention groups from Time 1 to Time 2 ($p < .05$). The participants also showed a relatively high degree of cognitive control when judging and performing the policy-capturing task (average R_s = .88) as compared to Framingham (R_e = .96). Significant amount of unconditional bias

(F(2, 57) = 9.85, p < .01) and conditional bias (F(2, 57) = 5.42), p < .05) was present in this sample. Nurse practitioners overall performed well when compared with the Framingham Heart Study risk equation, however, nurse practitioners showed little insight into their judgment process.

The results of this study may provide the opportunity for nurse practitioners to offer patients more appropriate medicinal and diagnostic treatments. Future cardiac events may be avoided through evidenced-based CHD education for nurse practitioners.

Chapter One

Introduction

Coronary Heart Disease

Coronary heart disease (CHD) is the single largest killer of American males and females residing in the United States. According to the American Heart Association (AHA), (2005) approximately 41% of Americans that experience a coronary attack in a given year will die from the event (AHA, 2005). To combat this growing problem, strategies need to be evaluated to assess how the identification of actual and potential CHD risk is made. Many primary care physicians employ advanced registered nurse practitioners (ARNPs). Practitioners are one of the first lines of defense towards the primary prevention of CHD (American Academy of Nurse Practitioners, 2002). They are at the forefront of assessment, detection, and treatment of potential and actual CHD risk factors for their primary care patients. In the early 1980's studies using the Social Judgment Theory were developed with a focus on understanding the healthcare provider's decision-making strategies. At that time, the role of the nurse practitioner was at its early stages rendering unavailable sample sizes to study. Presently, the role has greatly expanded and is so widely used that nurse practitioners are now considered primary care providers. This study evaluated the decision-making of ARNPs so their ability to accurately detect CHD risks could be validated and re-validated if necessary.

Incidence and Prevalence of Coronary Heart Disease

Coronary heart disease accounts for more than half of all cardiovascular events in men and women under 75 years of age (AHA, 2005; Hughes & Haymann, 2004). The average age of a person having a first heart attack is 65.8 years for men and 70.4 years for women (Hurst, 2002). Forty-nine percent of men and 32% of women have a lifetime risk of developing CHD after 40 years of age (AHA, 2005). During the year of 2005 it is estimated that 700,000 Americans will have a new coronary attack and approximately 500,000 will have a recurrent attack. Women lag behind men by 10 years for total CHD and by 20 years for more serious clinical events such as heart attack and sudden cardiac death (AHA, 2005). Age-adjusted CHD incidence rates per 1,000 person years were: white men, 12.5; black men, 10.6; white women, 4.0; and black women, 5.1 (Jones, Chambless, Folsom, Heiss, et al., 2002).

The prevalence of CHD in 2002 consisted of 13,000,000 Americans; 7,100,000 were men and 5,900,000 were women. Reported prevalence of myocardial infarctions was of 4,100,000 men and 3,000,000 women. Similarly the prevalence of new and recurrent heart attack and fatal CHD events consisted of 715,000 men and 485,000 women (AHA, 2005). According to the National Health and Nutrition Examination Survey (NHANES) 1999-2002, among Americans ages 40-74, the age adjusted prevalence of self-reported myocardial infarction and verified electrocardiogram myocardial infarction were higher among men than women; however angina prevalence was higher in women than men. It is estimated by the American Heart Association that in the year 2005 the direct and indirect cost of CHD will reach 142.1 billion dollars.

Coronary Heart Disease Mortality Rates

In 2002, CHD caused one of every five deaths in the U.S. while total mortality reached 656,000. It is estimated that every 26 seconds an American will suffer a coronary event, and every minute a person will die from one (AHA, 2005). In fact, 50% of men and 64% of women who died suddenly of CHD had no previous symptoms of the disease (AHA, 2005). It is estimated that twenty-five percent of men and thirty-eight percent of women will die within one year after having an initial recognized myocardial infarction (AHA, 2005). The higher death rate in women is partially a result of females having heart attacks at an older age than men, which renders women more likely to die within a few weeks.

CHD Risk Factors and Gender Differences

A number of CHD risk factors have been identified. For the purposes of this study eight CHD risk factors will be discussed. These factors were selected based on the recommendation by the Framingham Heart Study (Anderson, Wilson, Odell, & Kannel, 1991) and the American Heart Association (2005) for assessment of patient risk. This section contains facts, figures, and outcomes concerning the risk factors for coronary heart disease: age, gender, hyperlipidemia (total cholesterol and high-density lipoprotein), hypertension, smoking, diabetes, and left ventricular hypertrophy.

Age and Gender

Compared to men, pre-menopausal women are more protected from coronary heart disease and a cardiac event (AHA, 2005). However, a woman's risk and mortality concerning CHD increases with age; in contrast mortality for men is particularly high under the age of 60 (AHA, 2005).

Hyperlipidemia

This section will explore both total cholesterol and high- density lipoprotein (HDL-C). Approximately 70% of all U.S. women have at least one major CHD risk factor such as hyperlipidemia. Beginning at the age of 45 years, women have a higher percentage of total cholesterol (TC) than men (between 200 and 239 mg/dL) (AHA, 2005). Of women aged 20 years and older 53.6% of white, 46.4% of African Americans, and 44.7% of Hispanics have a total cholesterol level over 200 mg/dL (AHA, 2005). Total cholesterol is composed of high-density lipoprotein (HDL or "good") cholesterol, low-density lipoprotein (LDL or "bad") cholesterol and very-low density lipoprotein (VLDL), which carry triglycerides. Calories ingested in a meal and not used immediately by tissues are converted to triglycerides and transported to fat cells to be stored (AHA, 2006). The risk of heart attack in both men and women is highest when their total cholesterol is high and the high-density lipoprotein cholesterol is lower than 40 mg/dL (AHA, 2006).

Hypertension

One of the major CHD risk factors is hypertension (HTN). Nearly one-in-three adults in the U.S. have high blood pressure (Fields, Burt, Cutler, Hughes, Roccelia, & Sorlie, 2004). Approximately 28% of American adults over the age of 18 years have pre-hypertension which is defined as blood pressures of 120–139/80–89 mm Hg (AHA, 2006; Center for Disease Control (CDC), 2005; National Heart, Lung, and Blood Institute (NHLBI), 2005). Of those with HTN, 30% were not aware, thirty-four percent were medicated and were controlled, twenty-five percent were medicated and not controlled; and eleven percent were not medicated (JNC 7 2004). A higher percentage of men than women have HTN through the age of 55; thereafter the percentage of HTN in women is higher (AHA, 2005).

High blood pressure contributed to approximately 261,000 deaths in 2002 and had an estimated direct and indirect cost of 59.7 billion dollars in 2005 (AHA, 2005). Hypertension causes an increased workload on a person's heart and arteries. If high blood pressure persist organs such as the heart, kidneys, and brain may be affected. When hypertension is coupled with smoking, increasing age, and hyperlipidemia, the risk for a coronary event is doubled (AHA, 2005).

Smoking

Smoking is the most preventable cause of premature CHD deaths in the United States (AHA, 2005). It accounts for more than 440,000 deaths per year. It can increase blood pressure, decrease exercise tolerance, and increase the tendency for blood clotting (AHA, 2005). Statistics indicate that 25.2 million men and 20.0 million women smoke tobacco products. Among various ethnic groups (Whites, African American, Hispanic, Asians, and American Indian/Alaska Natives), the American Indian/Alaska Natives have the highest incidence of cigarette smoking in both men and women (AHA, 2005). Cigarette smoking is so widespread in the U.S. and such a significant risk factor that it is now considered the leading preventable cause of disease and deaths in the United States (AHA, 2005). On average, male smokers die 13.2 years earlier than male nonsmokers, and female smokers die 14.5 years earlier than female nonsmokers (Surgeon General, 2004). Cigarette smoking results in a two-to-three fold risk of dying from CHD (AHA, 2005). The estimated annual direct and indirect cost from smoking is 155 billion dollars (AHA, 2005).

Diabetes

Diabetes greatly increases the risk for CHD, even when blood glucose levels are well-controlled. More than 80% of people with diabetes die of heart or blood vessel disease. Approximately 3 million women and 2.9 million men have undiagnosed diabetes in the U.S (AHA, 2005). Approximately 6 million women and 8.5 million men have been diagnosed with pre-diabetes, (a fasting blood glucose level of 110 to 126 mg/dl). Finally, approximately 7 million women and 6.8 million men have a medical diagnosis of diabetes. On average, non-Hispanic black women have the highest incidence of physician-diagnosed diabetes followed closely by white women (AHA, 2005). A person with diabetes is two to four times more likely to die from heart disease compared to non-diabetics (AHA, 2005). In 2002, the total direct and indirect cost from diabetes was 132 billion dollars.

Left Ventricular Hypertrophy

Left ventricular hypertrophy is a condition consisting of an enlargement of the left side of the heart (AHA, 2006). A thickening of the heart muscle as a result of an increased workload can cause left ventricular hypertrophy (LVH); this increased workload could be a result of any one or more of the risk factors listed above. One of the main contributing factors to the development of LVH is hypertension. High blood pressure increases the resistance of the circulatory system and forces the left ventricle to work harder in order to pump the blood to meet the body's oxygen demands (AHA, 2006). This increased workload eventually causes the ventricles to become enlarged and inefficient leading to chronic heart failure.

Role of Advanced Health Care Providers

In general, the role of the health care provider is assessment, diagnosis, treatment, and education of the patient. Advanced practice healthcare providers must recognize potential and actual cardiovascular risk factors in their male and female patients. They design primary or secondary treatment plans and perform education on lifestyle changes and/or medicinal treatments available to lessen these risk factors for the patient involved.

Two types of advanced healthcare providers will be discussed: (1) medical doctors and (2) advanced registered nurse practitioners or "nurse practitioners". Both providers have advanced degrees in general medicine or specialty areas of nursing. A medical doctor completes a four-year graduate degree in medical school along with internships and residencies before moving to private practice. Nurse practitioners have completed a two-year graduate degree in nursing, which includes clinical residencies in a variety of clinical specialties, e.g. family practice, adult medicine, pediatrics or women's health.

The degree to which a nurse practitioner is allowed to practice independent of a medical doctor varies among the 50 states. However, all nurse practitioners are allowed to make medical diagnoses and prescribe prescription medications. Most graduate nurse practitioners work in a primary care/family practice type of setting. However, a smaller percentage of nurse practitioners work in specialty areas such as cardiovascular medicine. Studies have been conducted in the past to determine whether nurse practitioners can provide comparable care, as do physicians. The results have indicated that nurse practitioners can give equivalent care and that patients' perception of their care is much higher. This is likely due to the extra time and health education that nurse practitioners tend spend with individual patients during consultation (Horrock, Anderson, & Salisbury, 2002; Kinnersley, Andrson, Parry, Clement, Archard, et al., 2000). Other studies have been conducted measuring the outcomes of patients belonging to physician groups only compared to physician/nurse practitioner groups. The results indicated that level of care was of similar quality; however, physician/nurse practitioner group reported seeing patients more often and providing a cost saving to the healthcare system due to the lower fees of an ARNP visit (Aigner, Drew, & Phipps, 2004).

The Framingham Study

The Framingham study began in 1948 to evaluate the circumstances under which CHD occurs, develops and becomes fatal in the general population (AHA, 2005). The intention was to conduct a longitudinal study to help understand how those that develop CHD differ from those individuals who remain free of disease. Throughout the Framingham Study there have been three cohorts created: the original cohort consisted of 5,029 men and women in 1948; the second cohort called "the Offspring Cohort" was developed in 1971 and consisted of 5,124 men and women, and the third cohort created was named the "the Generation III Cohort," which consists of the offspring of the second cohort and is under current recruitment with a goal sample size of 3,500. As a result of this study the investigators developed coronary heart disease risk equations. Clinicians use the equation for predicting the development of CHD in those that are free of disease (AHA, 2005; Anderson, Wilson, Odell, & Kannel, 1991). They are based on a non-proportional hazards Weibull accelerated failure time model (Anderson, 1991). The model was applied to eight risk factors measured on 2,983 women and 2,590 men (age ranged from 30 - 72 years) from the Framingham and Framingham Offspring Cohorts.

The equations and explanation used in this study are provided by Anderson, et al. (1991).

Conceptual Framework

Social Judgment Theory and Decision-Making

Social Judgment Theory was first used four decades ago to analyze how people make decisions or judgments considering the cues and stimuli in their environment. Since then it has been used in meteorological forecasting, educational decision making, accounting, risk judgments, social welfare, medical and health-related decision making and ethics, risk judgments, and public project evaluations (Cooksey, 1996). Therefore, it will be used as the theory guiding the methodology of this study. Social Judgment Theory has also been used to analyze how individuals make judgments about ecological situations or probabilities of occurrences.

Hammond, Stewart, Brehmer, and Steinmann (1975) conceptualized the SJT to explain how judgments and decisions were formed retrospectively. To understand and model the process of cue utilization, researchers have developed data collection techniques called "policy capturing." Policy capturing derived from SJT as a method used to study representative, samples of alternatives between attributes and the judgment to be made (Cooksey, 1996). Policy capturing helps define how individuals evaluate and combine evidence from multiple cues to arrive at judgments about different situations (Holzworth et al.,1999). Policy capturing can be thought of as an individualized multiple regression equation. Basically, an individual makes a judgment regarding each of a series of cue profiles; these judgments are then regressed on the cues in order to obtain a weighted linear composite which characterizes the individual's method for combining cue information into a judgment (Cooksey, 1996). Many of the earlier works using judgment theory date back to the theoretical and methodological contributions by Brunswik and what he viewed as "Probabilistic Functioning." This approach attempts to understand the relationship between the person and their environment (the ecology) and how these factors may affect human judgment or decisions via perceptual cues (Cooksey, 1996). He also developed the "Lens Model" of human cognition and information, which will be used to form the basis of analysis for this study. The Lens Model will be described in depth later in this chapter.

Hammond (1996) proposed the integration of the Cognitive Continuum Theory with Social Judgment Theory. His intention was for the Cognitive Continuum Theory to be a culmination of an extended history of ideas concerning human cognition originating from Brunswik. The Cognitive Continuum Theory focuses specifically on the friction and division that exists between intuitive and analytical thinking. The continuum is seen as intuitive cognition at one pole and analytical cognition at the other pole with quasi-rationality in the middle. Intuitive cognition is considered to be rapid, covert, non-retraceable, inconsistent, with high confidence in outcome and low in process, and the errors are small and normally distributed (Cooksey, 1996). At the other pole lies analytic cognition, which is slow and sequential in nature, retraceable, consistent, logical, low confidence in outcome and high in process, errors tend to be large, and there is a large reliance on quantitative cues (Cooksey, 1996). The middle portion of the continuum contains quasi-rationality, which is thought of as an everyday cognitive process. Hammond (1996) maintains that human cognition constantly moves along the intuitive-analytical continuum depending on the judgment task and the ecological cues present.

Applicability of Social Judgment Theory to the Healthcare Setting

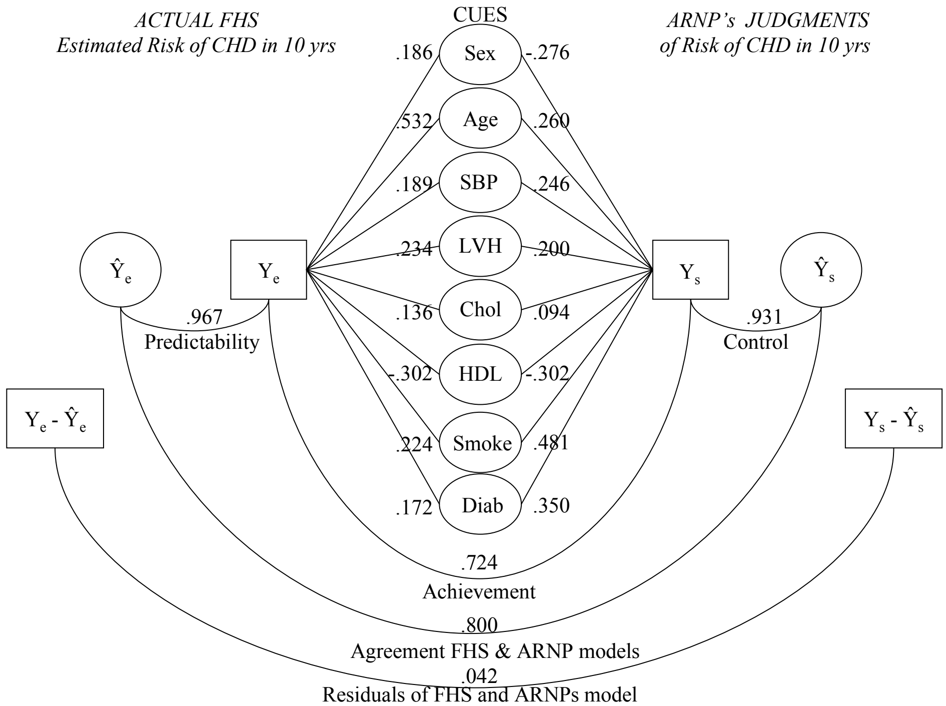
In this study, Social Judgment Theory was used to evaluate how nurse practitioners perceive and make judgments about patient's CHD risk factors and the necessity for change in health promotion behavior. There is a paucity of scientific research on how nurse practitioners make decisions. Social judgment theory can provide understanding of which risks nurse practitioners perceive, select, assemble, and use in conjunction with their environment to reach a judgment about the level of risk a patient has for the development of coronary heart disease. Although the application of Social Judgment Theory in nursing research began as early as the 1960's, its use has been rather infrequent throughout the forty years since its original development. Social judgment theory and the concept "judgment analysis" have been used in prior studies to examine clinical nurses' inference concerning states or physical conditions of patients in acute care facilities (Kelly, 1964; Thompson, Foster, Cole, & Dowding, 2005). This provided an avenue to further development of decision-making theory in the health promotion arena and nursing research.

Brunswik's Lens Model

Brunswik created the Lens Model as a device to represent how the various concepts involved in probabilistic functionalism could be summarized. This model illustrates how one perceives a cue and combines the information with the environment to form a judgment. Figure 1 illustrates how a nurse practitioner perceives CHD risk factors, weighs the risk factors by importance, and collect this information and the stimuli occurring in the environment to arrive at a judgment about a patient's individual risk for the development of coronary heart disease.

Basically, the left side of the model is the "judgment ecology," or the true state of a patient's actual CHD risk. The lines moving right towards the cues represent the regression or actual weights represented by each cue. The cues consist of eight CHD risk factors: age, smoking, hypertension, total cholesterol, high-density lipoprotein cholesterol (HDL-C) level, presence or absence of left ventricle hypertrophy (LVH), diabetes, and smoking. The right side of the model represents the "true ecology state," or the nurse practitioners' perception of a patient's CHD risk. This may also be called the "judged state." The lines on the right side of the model moving towards the cues represent how important the nurse practitioners viewed each cue. The difference between actual CHD risk (the left side of the model) and nurse practitioners perceived CHD risk (the right side of the model) will indicate the agreement between nurse practitioner's perceptions and judgments concerning patient's CHD risk. Analyzing how well the nurse practitioners unite the left and right side of the models in their judgment helps to predict their accuracy and consistency of perceptions for patients CHD risk.

Figure 1 Lens Model (Cooksey, 1996)



Relevance of Advanced Registered Nurse Practitioners as a Representative Cohort

Advanced registered nurse practitioners account for thirty-three percent of all registered nurses in the United States (American Academy of Nurse Practitioners, 2002). They practice in many different environments such as emergency departments, pediatric units and clinics, critical and acute care facilities, doctors' offices, and general practice clinics. Nurse practitioners can manage a wide spectrum of patient conditions ranging from acute to chronic while working in tandem with a medical doctor, Doctor of Osteopathy, or Dentist who serve as sponsor. Their educational background consists of an undergraduate degree in nursing and a master's degree in a specialty area such as family, adult, pediatric, mental health, or acute care. Nurse practitioners are at the forefront in regard to identifying potential and actual CHD risk factors for patients, which gives them the ability to greatly affect patient outcomes. Many recent studies have cited the increased satisfaction of patients that have a consultation with a nurse practitioner (Meyer & Meirs, 2005; Aigner, Drew, & Phipps, 2004; Horrocks, Anderson, & Salisbury, 2002; Kinnersley, Anderson, Perry et al., 2000). Patients that had consultations with ARNPs have viewed advantages such as having a longer consultation visit, which increased the amount of education and understanding of their disease process that in effect increases patient compliance with medications, diagnostic treatments and lifestyle modifications (Horrocks, Anderson, & Salisbury, 2002).

Advanced registered nurse practitioners were chosen as the sample for this study due to their nursing education and ability to respond with a high degree of accuracy to concise, scientifically worded questionnaires as demonstrated by the Nurses Health Study (1976). Advanced registered nurse practitioners are a population of highly motivated participants that would likely complete all data request for the study. They play a major role in diagnosis, treatment and education of patients concerning their cardiovascular risk factors in clinics and acute care settings. This population of health care providers will provide insight as to how nurse practitioners weigh and subsequently treat different CHD risk factors and how they may cluster a combination of risk factors to make judgments on prevention and treatment for women and men.

Nurses have been sampled for research in the past (Thompson, Foster, Cole, & Dowding, 2005; Beckstead, 2003; Holzworth & Wills; Kelly, 1964); however, a paucity of research has been conducted on how nurse practitioners perceive patient's actual CHD risk factors. In addition, little research has been conducted analyzing how much weight they apply to CHD risk factors such as age, gender, smoking, cholesterol, hypertension, LVH, smoking, and diabetes, which may affect when and how nurse practitioners educate about health promotion behaviors.

Furthermore, advanced registered nurse practitioners represent a large sample of health care providers from a variety of ethnicities, and ages. They are one of the main sources of health education, and serve as role models of health for the patients that they work with everyday. Greater understanding of the relationship between nurse practitioners judgments of CHD risk and how it affects their treatment and prevention strategies is warranted.

Purpose of the Study

The purpose of this study is twofold: (1) to describe how advanced registered nurse practitioners combine patient characteristics (cues) when judging patient's risk of coronary heart disease and (2) to assess the effect that feedback has on improving advanced registered nurse practitioner's judgments of patient risk.

Statement of Problem

There is a paucity of literature concerning how nurse practitioners analyze and weigh patient risk factors when judging a patient's risk for CHD. There is also a lack of literature explaining how nurse practitioners judgments of CHD risk factors compare to the actual Framingham Heart Study's estimated risks. A greater understanding of the knowledge and perceptions of nurse practitioners concerning CHD risk factors is warranted in order to shed light on the accuracy of treatment strategies and educational goals for nurse practitioners and their patients.

Specific Aims

The specific aims of the study are as follows:

1. To describe how advanced registered nurse practitioners combine patient characteristics (cues) when judging patient's risk of coronary heart disease.

Research Questions for Aim 1:

1a - How do advanced registered nurse practitioners distribute importance weights among the various cues as they judge risk?

1b - How accurate are their judgments as compared with actual Framingham Heart Study's estimated risks?

1c - How well does an additive linear model represent advanced registered nurse practitioners' judgment policies?

1d - How much insight do advanced registered nurse practitioners have into their judgment processes?

2. To assess the effects that feedback has on improving advanced registered nurse practitioners' judgments of patient risk.

Hypotheses for Aim 2:

2a - Participants receiving feedback prior to completing a second policy capturing task will show increased agreement and achievement in their risk assessments as compared to participants who do not receive feedback prior to the second policy capturing task.

2b - Participants receiving feedback prior to completing second policy-capturing task will show greater insight into their judgments of risk as compared to participants who do not receive feedback.

Definition of Terms

The following terms are defined and will be used throughout the study. The study definitions are derived partially from their use in previous research and are established definitions in judgments and coronary heart disease research.

Judgment

Judgment is defined as exposure to environmental cues and drawing a cognitive decision to assess situations or circumstances perceptively and to draw sound conclusions (Cooksey, 1996). The Brunswik Lens Model and a multiple regression analysis will be used to measure judgment.

Cognitive control

Cognitive control refers to the similarity between an individual's judgment policy in a judgment task and the predictions of those responses made by a specific mathematical model, in this case a simple additive linear model. It is expressed as the correlation (*R)* between judgments and predictions of those judgments by an individual's policy equation (Cooksey, 1996).

Accuracy or agreement

Accuracy refers to the degree of correspondence between an individual's responses to cue profiles and the ecological criterion (e.g., actual risk of CHD for the profiles according to the AHA) (Cooksey, 1996).

Achievement

Achievement refers to the degree of correlation between an individual's responses to the profiles and the ecological criterion (e.g., actual risk of CHD). It is expressed as the Pearson correlation coefficient (Cooksey, 1996).

Insight

Insight refers to the correspondence between the individual's self reported cue importance and the importance weights derived via statistical analysis. Insight may be gauged by substituting self-reported weights into the regression equation and comparing the predictions from this model to those made from the statistical model.

Smoking

Smoking is defined as the inhalation of tobacco products one or more times a calendar day, week, or month (AHA, 2006).

Hypertension

Hypertension is defined as maintaining a systolic blood pressure above 140 mmHg and/or a diastolic blood pressure of 90 mmHg or above with or without current medicinal treatment (AHA, 2005).

Healthy Lipid Profile

A lipid profile that shows (1) a fasting total cholesterol level of 200 mg/dl or less, (2) high density lipoproteins (HDL) level of 50 mg/dl or higher, and (3) a low-density lipoprotein level of 100 mg/dl or less as measured by a blood serum level (AHA, 2005).

Advanced Registered Nurse Practitioner

This participant must hold a current advanced registered nurse practitioner state board of nursing certification, be licensed in the state of Florida, and be in the specialty area of family or acute care.

Significance for Nursing

Given that many patients smoke tobacco, have dangerously high lipid levels, and diabetes, and have treated and untreated hypertension, it is important to study how these variables affect nurse practitioners decision-making and judgments towards prevention and treatment of CHD risk. This study will attempt to understand the decision-making and judgments by advanced registered nurse practitioners concerning patient's risk for developing coronary heart disease. The hypothetical cues will reveal how much advanced registered nurse practitioners weigh the importance with reference to each of the eight coronary heart disease risk factors: age, gender, systolic blood pressure, total cholesterol, high-density lipoprotein cholesterol, left ventricular hypertrophy, diabetes, and smoking. Also, advanced registered nurse practitioners' agreement and achievement in the estimation of CHD risk factors will be measured. The findings from this study will provide insight into how nurse practitioners judge, diagnosis, and treat the number one killer of Americans, coronary heart disease.

Chapter Summary

Coronary heart disease is the leading cause of death for Americans (AHA, 2005). The objectives of this study were first to describe how nurse practitioners combine patient characteristics (cues) when judging a patient's risk of CHD. The second objective was to assess the effects that feedback has on improving nurse practitioners' judgments of patient risk. Determining how nurse practitioners make judgments about patients CHD risk factors will provide the ability to customize continuing education modules and university curriculums directed towards specific identified gaps in CHD risk factor knowledge.

The current focus in the literature is on recognition of CHD risk factors in women and men; this study will add to the scientific literature that seeks ways of identifying how nurse practitioners make judgments concerning CHD risk. The findings will provide insight into how nurse practitioners judge CHD risk factor severity and combine patient risk characteristics during the evaluation process. In addition, the effects of feedback were examined to provide knowledge in areas of agreement and achievement concerning nurse practitioners judgments of CHD risk. Once it is determined that nurse practitioners weigh each CHD risk factor differently and also differ concerning their cognitive control and agreement in judgments, more appropriate education strategies may be used to make curricular changes, continuing education revisions, and individual counseling to increase awareness. This provides the opportunity for nurse practitioners to give patients more appropriate medicinal, diagnostic, and education treatments and materials. It also provides an opportunity to increase primary and secondary preventive techniques in the hope to minimize the chances of a future cardiac event. The next chapter will present the theoretical framework and the literature supporting the study of nurse practitioners decision-making techniques.

Chapter Two

Review of Literature

This chapter presents the theoretical frameworks for this study as well as a review of empirical literature pertinent to advanced registered nurse practitioners' judgments about men and women's risk for the development of CHD.

Introduction

The understanding of how clinicians assess patient risk for disease and make decisions to refer patients to specialists when appropriate is important for optimizing professional training and practice and, for ensuring that patients receive the highest quality of care possible. Several studies on clinical inferences made by nurses have been conducted (Kelly & Hammond, 1964). Some of the topics examined included the types of processes nurses utilized during practice (Hammond, Kelly, Schneider, & Vancini, 1966), information-seeking strategies nurses used when assessing the state of their patients (Hammond, Kelly, Schneider, &, Vancini, 1966), and how nurses revised their judgments of the patient when presented with new information (Hammond, Kelly, Castellan, Schneider, & Vancini, 1967).

Theoretical Framework

Social Judgment Theory

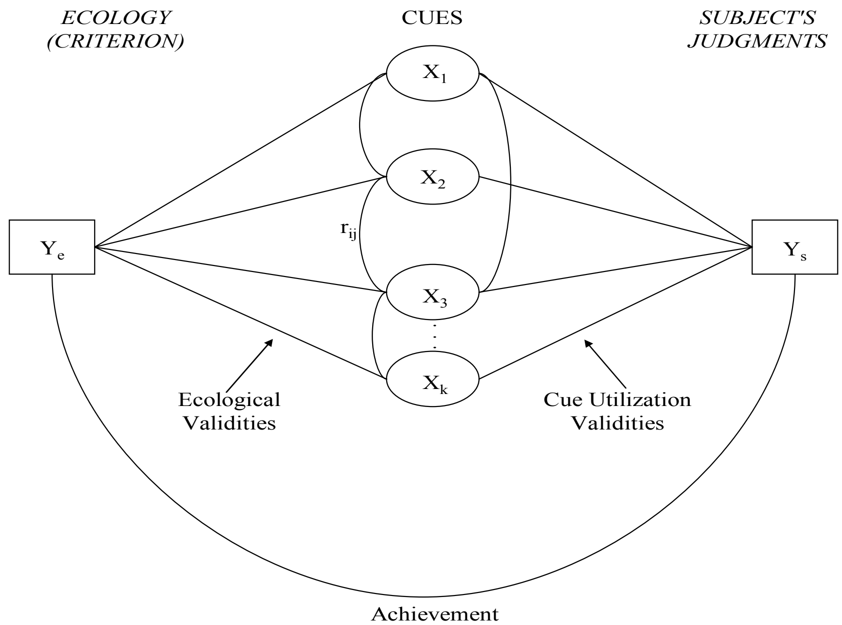
In 1975, Hammond, Stewart, Brehmer, and Steinmann proposed the Social Judgment Theory to examine how judgments and decisions are formed retrospectively.

Researchers have applied this theory as a tool for conducting studies evaluating how individuals make judgments about ecological (environmental) situations or probabilities of occurrences. It has been utilized in educational decision-making (Cooksey, 1988; Heald, 1991; Snow, 1968; Shulman & Elstein, 1975), medical and health-related decision-making and ethics (Flynn, 1994; Slovic, Rorer, & Hoffman, 1971; Smith & Wigton, 1988; Wigton, 1988), accounting and auditing (Libby, 1981; Waller, 1988), risk judgments and social welfare (Cooksey, 1996). It has also been used successfully to study decision making across a wide array of clinical settings including diagnostic and treatment decisions among physicians (Fisch, Hammond, Joyce & O'Reilly, 1981; Gillis, Lipkin, & Moran, 1981; Smith, Gilhooly, & Walker, 2003), physicians' and patients' compliance with treatment regimens (Rothert, 1982), and nurses' decisions to seclude and restrain psychiatric patients (Holzworth & Wills, 1999). The Social Judgment Theory approach has also proven useful for assessing the effectiveness of physician (Wigton, Poses, Collins, & Cebul, 1990) and nurse (Thompson, Foster, Cole & Dowding, 2005) education programs.

Despite the broad use of the Social Judgment Theory a paucity of scientific research has been conducted concerning the decision-making process of nurse practitioners and their judgments about coronary heart disease risk factors. Social Judgment Theory was utilized in this study to provide a framework and understanding of nurse practitioner's decision-making process and how they analyze the cues to form a diagnosis of CHD risk.

When studying how nurse practitioners judge the 10-year coronary heart disease risk for a patient, the patient typically will present with one or more risk factors or symptoms. The nurse practitioner must have a systematic way of collectively weighing cues derived from the patient and come to a decision or judgment about their appreciable risk.

Figure 2 Brunswik Lens Model (Cooksey, 1996)



Brunswik Lens Model

Social Judgment Theory was developed from Brunswick's (1956) concepts of probabilistic functionalism and representative design. Hammond et al., (1975) provided the first complete description of how these concepts could be applied to the study of human judgment. The theory is concerned with the correspondence between a person's judgments and the environment. These relationships are illustrated using the Lens Model above.

Balzer, Doherty and O'Conner (1989) presented a conceptual organization of the Lens Model. Briefly, X_k denotes the attributes of some multi-attribute object of judgment that in the context of the judgment task are called cues. The Y refers to either criteria or responses. The subscripts *e* and *s* designate the environment and the subject, respectively. The hats (^) represent predicted values, usually from least squares regression models of the respective "slides" of the lens. Cues are related to the criteria via some weight (w_{ek}) and correspondingly to the subject's responses (w_{sk}). These weights may be correlation coefficients, or alternatively regression coefficients. The model allows for correlations (redundancies) among the cues.

The term r_a is the correlation between the person's judgments and the environment, and is referred to as *achievement*. For example, in the present study achievement pertains to ARNPs' precision in assessing the relative degree of risk among a series of patient profiles as defined by the Framingham Heart Study's standards. Two multivariate correlations in the Lens Model, R_e, the extent to which the criterion is predictable in the environment and R_s, the extent to which the person applies his or her judgment policy in a systematic manner, given the name *cognitive control*, are estimated from the regression models. The amount of knowledge that the person has about the relationships of cues to the environment is expressed using two other bi-variate correlations *G* and *C*, referring to linear and nonlinear relationships respectively. *G* is calculated as the correlation between the predicted values from each regression equation ($\hat{Y}_e$ *and* $\hat{Y}_s$) and *C* is the correlation between the residuals from each regression ($Y_e - \hat{Y}_e$ *and* $Y_s - \hat{Y}_s$). The relationships among these various correlations in the Lens Model are summarized in the Lens Model Equation developed by Hammond, Hursch, and Todd (1964) and simplified by Tucker (1964) as: $r_a = R_e R_s G + C[1 - R^2_e)(1 - R^2_s)]^{1/2}$.

Hence a person's precision in predicting the environment (r_a) is a function of the extent to which the environment is predictable (R_e) their knowledge of the environment

(G and C) and the extent to which they systematically apply their knowledge *(R_s)*.

In order to understand and model the process of cue utilization, researchers have developed techniques called “policy capturing.” Policy capturing (PC) is the process of applying multiple regression methods to obtain a representation of a judge's policy or judgment process. The typical policy-capturing task presents a judge (e.g., an ARNP) with a series of profiles (e.g., patients) to be judged on some relevant dimension (risk of CHD). The profiles are constructed of 8 (*k*) representative cues that can take on different values. Analysis proceeds on an individual basis where the fundamental data set for policy capturing comprises 70 (*m*) profiles of 8 (*k*) suitably quantified cue values and the set of 70 (*m*) judgments made by the judge. The relative importance (weights) of the cues is then determined using the standardized regression coefficients. In this study we will use a policy capturing approach to understand how the nurse practitioners form judgments of patient risk for CHD across 70 profiles constructed from eight cues.

In policy capturing designs that include replicated profiles makes it possible to estimate *cognitive consistency (Rc)* or the extent to which the judge performs similarly when responding to identical profiles on different occasions. Both cognitive control and cognitive consistency represent how orderly the individual is at making sense of the environment. Furthermore, in policy capturing designs where there is an environmental criterion, it is possible to estimate achievement. These types of designs also allow for other indices of accuracy. Two such indices are *precision*, the amount on average that a judge’s response differs from the criterion value, and *elevation*, the amount by which the judge’s overall mean rating of risk is too high or too low when compared to the mean of the criterion values.

Brunswik created the Lens Model as a device for representing how the various concepts involved in probabilistic functionalism could be summarized. This model illustrates how one perceives a cue and combines the information with the environment to form a judgment. Figure 1 illustrates how a nurse practitioner may perceive coronary heart disease risk factors, weigh the risk factors by importance, and recall this information and the stimulus occurring in the environment to arrive at a judgment about a person's individual risk for the development of CHD. Basically, the left side of the model is the "judgment ecology," or the true state of actual CHD risk. The lines, moving right towards the cues, represent the regression or actual weights represented by each cue. The cues consist of eight coronary heart disease risk factors: age, gender, smoking, systolic blood pressure, total cholesterol, HDL-C level, diabetes, and LVH. The right side of the model represents the "true ecology state," or the nurse practitioner's judgment of patients' CHD risk. This may also be called the "judged state." The lines on the right side of the model moving towards the cues will represents how important the nurse practitioners viewed each cue. The difference between actual coronary heart disease risk (the left side of the model) and a nurse practitioners' judged coronary heart disease risk (the right side of the model) will indicate how precise the nurse practitioners' judgments are concerning patients' CHD risk. Analyzing how well the nurse practitioners unite the left and right side of the models in their judgment helps to predict their accuracy and consistency of judgments for patients' coronary heart disease risk.

Review of Literature

Many studies have been conducted evaluating how physicians make diagnostic decisions concerning their patients; however, there is a paucity of research concerning the decision-making process of nurse practitioners. The following are studies conducted using the Social Judgment Theory to analyze the decision making of physicians and nurses concerning patient diagnosis and interventions.

Nurses Decision-Making

Throughout the last 40 years researchers have evaluated how nurses not only make decisions about the state of their patients but also the accuracy and consistency by which they make the decisions (Kelly, 1964; 1966; Holzworth & Willis, 1999; Watson, 1994; Thompson, Foster, Cole, and Dowding, 2005). Nurses' judgments have been compared with other nurses employed in the same setting and patient population to examine if nurses would make similar judgments or decisions about the same patient scenario. Interestingly, nurses throughout the duration of 40 years of research have demonstrated inconsistency with their decision-making strategies and tend to demonstrate little agreement with their peers (Kelly, 1964; Holzworth & Willis, 1999; Watson, 1994; Thompson, Foster, Cole, and Dowding, 2005).

Nurses are legally responsible for evaluating signs and symptoms a patient presents in order to plan and implement appropriate nursing interventions (Kelly, 1964). Watson (1994) inferred that nurses' decision-making skills need to be evaluated since the nurse is held responsible and accountable for their outcomes. No longer are nurses directly dependent on physicians to make every decision during patient care. Nurses are expected to base their decisions on scientific evidence and to demonstrate the ability to give their reasons for interventions when challenged (Watson, 1994). Examples of essential nursing decisions include recognition of symptoms leading to the patients' declining state of condition, determining when a medicinal/ physician intervention is necessary, and appropriateness of seclusion or restraint of a psychiatric or hallucinating patient for the safety of themselves and others (Kelly, 1964; 1966; Hammond 1964; Watson, 1994; Holzworth & Wills, 1999; Thompson, Foster, Cole, & Dowding, 2005).

In 1999, Holzworth & Wills studied the decision making of nine registered nurses who were employed in a psychiatric care facility. Those nurses were evaluated for the systematic process, accuracy, insight, and consistency regarding the need to closely observe, physically restrain, or seclude their short-term psychiatric patients. Social Judgment Theory was used as the primary theoretical framework for the study. Interestingly, nurses favored observation of patients over seclusion or restraint. Nurses generally had good insight into their own judgments'. However, individual differences in cue utilization and inconsistency in strategy usage led to disagreement among nurses about specific interventions utilized. Furthermore, nurses agreed with others' judgments only one-third of the time (Holzworth & Wills, 1999).

Similarly, Watson (1994) completed an exploratory study to evaluate decision-making by nurses in a medical-surgical hospital clinical area. Nurses were followed for two hours during one shift. A secondary objective of this study was to evaluate why some nurses make irrational decisions concerning patient care. The judges (nurses) were asked to make decisions on which dressing was most appropriate for a particular wound, the probability of the wound healing within three to four weeks, the current amount of patient comfort, and frequency with which the dressing should be changed. Watson concluded that 83% of the time nurses based their decisions on prior experience ($p = 0.04$) versus protocol. The nurse judges were not consistent the majority of the time with the exception of three judges. Very rarely was the protocol of the nursing unit a reason given by the nurses in their decision-making process.

Social Judgment Theory has been used in studies that evaluate the educational and learning needs in different specializations of nursing. Thompson, Foster, Cole & Dowding, (2005) used the SJT to evaluate the how nurses use clinical information when diagnosing hypovolemic shock in a series of simulated patient cases showing signs and symptoms of shock. The researchers' main purpose was to examine how nurses combined evidence-based research knowledge with knowledge of available resources, clinical expertise and the patients' preferences to make a decision. The participants were given a pre-test via computer then asked to sit in on a 30-minute lecture concerning signs and symptoms of hypovolemic shock (blood pressure status, pulse, respiratory rate, oxygen saturation, and urine output). Next the students or nurses were asked to return to their computers and take the post-test measuring how much data they learning during the lecture concerning the diagnosis of hypovolemic shock. The results indicated that there was little agreement among the nurses concerning their judgments of whether the patients were in shock or not. The authors found that there was a consistent 10% disagreement between the nurses regarding the patient's hemodynamic status. The study showed that clinicians use information in different ways to form their judgment policies.

Physician Decision-Making

Social Judgment Theory has been used to investigate a variety of physician practice patterns in medical settings (Wigton, 1988; 1996; Engel et al., 1990). Examples include evaluating how physicians make decisions concerning their prescriptive practices (Gillis, Lipkin, & Moran, 1981;Smith, Gilhooly, & Walker, 2003), diagnosing criteria (Wigton, Poses, Collins, & Cebul 1990), referral practices (Rothert, Roverner, Elstein, Holzman, Holmes, & Ravitch, 1984), treatment strategies, and frequency of ordering laboratory test (Holmes, Rover, Rothert, Schmitt, Given, & Ialongo, 1989), and attitudes about patient regimen compliance (Rothert, 1982). The use of research guided by the SJT has also proven useful for assessing the effectiveness of physician education programs (Wigton, Poses, Collins, & Cebul 1990).

Investigators have determined that physicians improve their diagnosing accuracy when receiving multiple scenarios and periodic education concerning their diagnostic decisions (Wigton, Poses, Collins, & Cebul 1990). Many SJT studies have found that there is little agreement between physician judges when comparing prescriptive practices, treatment strategies, and referral practices. The literature has indicated that physicians did agree concerning their expectations of patients remaining compliance to their treatment regimen. This could lead to a decrease in patient compliance due to unconscious self-full-filling prophecy by the physician (Rothert, 1982). Moreover, differences among physicians have demonstrated an inconsistent use of symptom information and weighing of the cues (symptoms). Physicians' expectations of patients' compliance with prescriptive regimens along with the amount of referral to specialist differed greatly (Gillis, Lipkin, & Moran, 1981;Smith, Gilhooly, & Walker, 2003; Rothert, Roverner, Elstein, Holzman, Holmes, & Ravitch, 1984).

Based on past studies it has been determined that feedback to physicians about how they use information in making judgments can improve the quality of their judgments (Tape, Kripal, & Wigton, 1992). Tape, Kripal, & Wigton (1992) completed a study measuring different types of feedback and first year medical students' successfulness with recognizing CHD risk factors in patients. The researchers' had two treatment groups and two control groups. One treatment group consisted of probabilistic feedback, where the students received the correct probabilities of the patient developing CHD after each scenario was judged. Group two received cognitive feedback detailing the accuracy and consistency of their judgment after each scenario. The two control groups consisted of one group that received education materials after the pre-test, before post-test; the second control group received no information before or after the pre- post-test. The student physicians had higher discrimination ability following the probabilistic feedback intervention and improved achievement with the cognitive feedback group. The control groups did not show significant achievement scores after the post-test (Tape, et al, 1992). This outcome leads to the conclusion that the participants receiving the correct probabilities of the patient developing CHD exhibited greater discrimination in recognizing which CHD risk factors were most heavily weighed in patients versus the cognitive feedback group that received the information of how accurate and consistent they were with their judgments demonstrated a higher achievement score, which means a greater correlation with the actual CHD risk factors (ecology side of the model).

Tape, Heckerling, Ornato, & Wigton (1991) used the Lens Model to compare physicians' likelihood estimates of pneumonia with the actual relationships of patients' clinical findings and their radiographic diagnoses. Three sites were used for the study: Nebraska, Illinois, and Virginia. The study indicated that Nebraska and Virginia physicians were more accurate than the physicians in Illinois with regard to predicitions of pneumonia. Furthermore, the researchers found that the physicians' in Nebraska and Virginia had strategies that were close to the optimal strategies as calculated from the patient data at all sites. It was estimated that the differences in predictability were due to the differences in the study populations rather than differences in physicians' ability. The Illinois site had a larger indigent patient population than the Nebraska or Virginia sites. However, these types of differences have been observed in other regional variation studies (Lewis, 1969; Epstein & McNeil (1985).

Insight and Judgment Policies

Insight refers to the correspondence between the individual's self-reported cue importance and the importance weights derived via statistical analysis. Insight may be gauged by substituting self-reported weights into the regression equation and comparing the predictions from this model to those made from the statistical model. Typically, subjects are asked to divide 100 points among the cues analyzed and these results are compared to the actual values given within the scenarios (Reilly & Doherty, 1989). Researchers have examined the amount of insight professionals have into their decision-making outcomes and found that individuals typically lack insight when evaluating self-reported cues (Slovic & Lichtenstein, 1971; Nisbett & Wilson, 1977; Schmitt & Levine, 1977; Anderson & Zalinskii, 1988; Reilly & Doherty, 1989; Reilly & Doherty, 1992). Reilly and Doherty (1989) completed a study evaluating how forty college students majoring in accounting made holistic judgments concerning 160 hypothetical scenarios about job offers. A similar study conducted by Roose and Doherty (1978) evaluated how 42 faculty members provided holistic judgments of what they believed to be fair employment salaries. The sample frame was thought to be a highly intelligent with the possibility of a highly insightful group of subjects to measure. In the previous study with the sample comprising of accounting students, the results indicated a great degree of insight when the judges were asked to physically identify their judgment out of a stack of different judgments on the same topic. However, when the subject's data were statistically analyzed with direct comparisons of the weights, little insight was found among the accounting students. This allowed the researchers to concluded that subjects were able to visually identify their self-reported cue weights ($p = .025$); but when insight was expressed via a standard method of producing weights the accountant students were found to have moderate self-insight at best (Reilly & Doherty, 1989). The same results occurred in the study evaluating PhD faculty's insight into employment salaries (Roose & Doherty, 1978).

Reilly and Doherty (1992) continued studies on self-insight using a sample of female college students that were housed in a college dormitory to evaluate if the students had self-insight into their judgments concerning the desirability of a potential roommate. They also wanted to evaluate if the subjects who could identify their own captured policy and identify their own subjective weights. The results revealed that subjects were more likely to select their own policies when there were twelve cues versus six ($p > .05$). Only a small proportion of the students' statistical weights were highly correlated with their subjective weights (Reilly & Doherty, 1992).

Many researchers studying self-insight agree that from the variability of policies clinicians are not operating under one set of diagnostic principles (Reilly & Doherty, (1989; Ullman & Doherty, 1984). Furthermore, it has been reported that there was a great amount of disagreement in the decision-making process of physicians, psychologists, and others in the diagnostic fields ((Reilly & Doherty, (1989; Ullman & Doherty, 1984; Bohn, 1984). The literature indicates that subjects in many of the fields studied have an insight of 50% (Reilly & Doherty, 1992).

Cognitive Feedback and Judgment

Cognitive feedback refers to the process of presenting the subject information about the relationship in the environment such as task information, cognitive information, and the relationship between the environment and the subject's perceptions of the environment (Blazer, Doherty, & O'Conner, 1989). Cognitive feedback refers to information about relations instead of outcomes. Cognitive feedback has been found to improve the accuracy of judges in many circumstances (Blazer, Doherty, & O'Conner, 1989). The cognitive feedback concept was derived from the framework of the lens model.

Task information refers to the relationship between the cues and the criterion (eight CHD risk factors and the risk of development of CHD in the next 10 years), information about the criterion or the cues themselves, or both. The cognitive information component greatly mimics task information, with the difference being the correspondence between the cues and the subject side of the model. Functional validity indexes include the achievement correlation *(ra)*, the correlation between the predictions of the linear model between the environment and the linear model of the subject *(G)*, and the correlation between the residuals from the prediction of the environmental and subject models *(C)* (Blazer, Doherty, & O'Conner, 1989). Essentially, feedback is the process by which information from the ecology side of the model is compared to the subjects' judgment with the ecology and the results are revealed to the participant before taking another policy capturing task. This enables the individual to understand the "gold standard" of information and improve their judgments if necessary.

Balzer, Sulsky, Hammer, and Sumner (1992) completed a study evaluating whether different types of cognitive feedback lead to different levels of performance. Undergraduate college students (n = 133) were assigned to five different groups: (1) task information only; (2) cognitive information only; (3) task and cognitive information; (4) task, cognitive, and functional validity information; (5) and control group (no feedback). The subjects were asked to predict the number of baseball wins from a multiple cue probability learning task. The results indicated that subjects who received task information in any of the groups showed a significantly better performance than subjects in the control group. The cognitive information group performed no better than the control group.

In 1994, Balzer, Hammer, Sumner, Birchenough, Martens, and Raymark performed a follow-up study to replicate the effects of cognitive feedback. Again the investigators used undergraduate college students as their subjects and found that task information was a necessary component to improve performance.

The Importance of Studying ARNPs

Advanced Registered Nurse Practitioners account for thirty-three percent of all registered nurses in the United States (American Academy of Nurse Practitioners). They practice in many different environments such as emergency departments, pediatric units and clinics, critical and acute care facilities, doctors' offices, and general practice clinics.

Advanced registered nurse practitioners work concurrently with a medical doctor (MD), Doctor of Osteopathy (DO), or Dentist (DDS) who serve as sponsor. Their educational background consists of an undergraduate degree in nursing and a master's degree in a specialty area such as family, adult, pediatric, mental health, or acute care.

Nurse practitioners are at the forefront in regard to identifying potential and actual CHD risk factors for patients, which gives them the ability to greatly affect patient outcomes.

Many recent studies have cited the increased satisfaction of patients that have a consultation with an ARNP (Aigner, Drew, Phipps, 2004; Meyers & Meir, 2005; Horrocks, Anderson, Salisbury, 2002; Kinnersley, Anderson Parry, Clement, Archard, et al., 2000). Patients that had consultations with ARNPs cited perceived advantages as having a longer consultation visit which increased the amount of education and understanding of their disease process that in turn increases patient compliance with medications, diagnostic treatments and lifestyle modifications (Horrocks, Anderson, Salisbury, 2002).

In the United States today many primary care physicians employ nurse practitioners to share in the care of their patients (LeClaire, 2005). In 2004 there were an estimated 141,209 licensed ARNPs (U.S. Department of Health and Human Services, 2005). According to the American Academy of Nurse Practitioners (2005), 66% of ARNPs work in at least one primary care site. Research on the increasing role of nurse practitioners in the health care industry has demonstrated that patient care under the MD/ARNP model is comparable to the MD alone model (Aigner, Drew & Phipps, 2004; Horrocks, Anderson & Salisbury, 2002; Kinnersley, Anderson Parry, Clement, Archard, et al., 2000). Patients report greater satisfaction with the healthcare they receive under the MD/ARNP model (Horrocks et al. 2002; Kinnersley, et al., 2000). Comparing nurse practitioners to MDs, Kinnersley, et al. (2000) found that nurse practitioners made referrals to care specialists at rates greater than or equal to general practice MDs. Horrocks, et al, (2002) report that ARNPs spend more time with patients per clinic visit than do physicians. Given their role in primary care, nurse practitioners represent an important resource in early detection of numerous diseases.

Understanding how nurse practitioners use patient symptoms or risk factors to form judgments of patient risk for disease and how such risk assessments influence referral decisions may improve general disease prevention efforts. Below is a figure detailing a logic model of this study; it begins by indicating the population of adult or family nurse practitioners with a varied amount in years of experience and that they will exhibit increased critical thinking skills when making assessments concerning patient risk factors by distributing weight among risk factors. Next a judgment will be made concerning a patient's risk of having a cardiac event in the next 10 years. This decision-making process may be affected if they receive feedback about their performance concerning assigning importance weight to the eight CHD risk factors. Information concerning the educational need for nurse practitioners will also be evaluated depending on the results obtained.

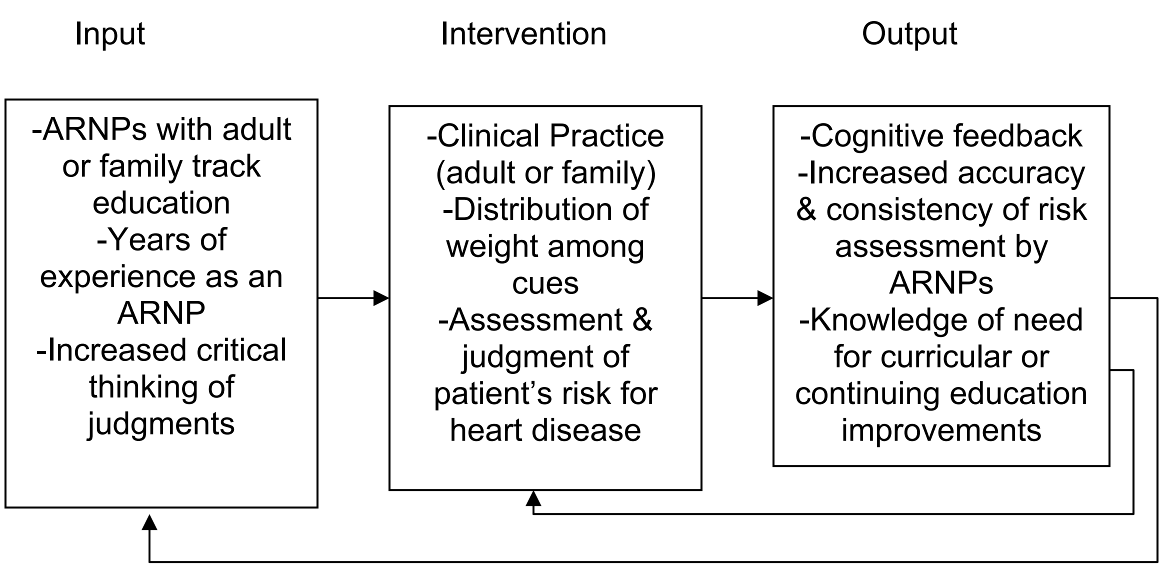


Figure 3 Logic Model

The Importance of the Framingham Heart Study

The original Framingham Heart Study (FHS) was conducted during 1948-1971 to measure Americans risk for the development of heart disease. In 1971, a new phase of the study began called the Framingham Offspring Study. This study has evaluated the development of CHD in the offspring of the original cohort of participants. In 2002, the study entered a third new phase by enrolling the grandchildren of the original cohort, which has allowed researchers to have access to three generations of individuals to determine not only environmental or exposures that contribute to heart disease risk but genetic components as well. Many studies were conducted to evaluate the type and amount of risk factors were causal for CHD. The FHS provided gender specific CHD prediction functions for assessing risk of developing CHD in a ethnically diverse middle-class population. Many prospective studies have evolved using the Framingham data and were reviewed in the above literature: the Atherosclerosis Risk in Communities Study (1987-1988); Physician's Health Study (1982); Honolulu Heart Program (1980-1982); Puerto Rico Heart Health Program (1965-1968); Strong Heart Study (1989-1991); and Cardiovascular Health Study (1989-1990).

Summary

Coronary heart disease is the single largest killer of American males and females (AHA, 2005). According to the AHA approximately 41% of Americans that experience a coronary attack in a given year will die from it (AHA, 2005). To combat this growing problem, strategies need to be evaluated to assess how the identification of actual and potential CHD risk decisions is conducted. Many primary care physicians employ nurse practitioners making them one of the first lines of defense towards primary prevention of

CHD (American Academy of Nurse Practioners, 2002). They are at the forefront of assessment, detection, and treatment of potential and actual CHD risk factors for their primary care patients. In the early 1980's studies using Social Judgment Theory were developed with a focus on understanding the healthcare provider's decision-making strategies. At that time, the role of the nurse practitioner was at its early stages rendering unavailable sample sizes to study. Presently, the role has greatly developed and is so widely used that nurse practitioners are now considered primary care providers.

The current focus in the literature is on recognition of CHD risk factors in women and men; this study will add to the scientific literature that seeks ways of identifying educational needs of nurse practitioners. The findings provide insight into how nurse practitioners judge CHD risk factor severity and combine patient risk characteristics during the evaluation process. In addition, the effects of cognitive feedback were examined to provide knowledge in areas of accuracy and achievement concerning nurse practitioners judgments of CHD risk. If it is determined that nurse practitioners weigh each CHD risk factor differently and also differ in terms of their accuracy and consistency in judgments, more appropriate education strategies may be used to make curricular changes, continuing education revisions, and individual counseling to increase awareness. This will provide an opportunity for nurse practitioners to give patients more appropriate medicinal, diagnostic, and education treatments and materials. It also will provide an opportunity to increase primary and secondary preventive techniques in the hope of minimizing the chances of a future cardiac event.

Foundation for Future Research

Future research concerning how healthcare providers make decisions regarding preventive patient care can be explored. Judges' strategies and agreement levels can be determined and presented to the clinician to evaluate how their weights or decision processes compare with those of their colleagues and why the differ. Such comparisons can, in turn, serve as the foundation for discussing diagnostic strategies and reducing inter-judge discrepancies. This technique will also allow a way of evaluating the success of educational tools for clinicians by retesting using the lens model and cognitive feedback method. Findings of this study will also be useful for informing policy and curricular decisions.

The next chapter will discuss the study sample, design, research questions, and hypothesis for the evaluation and analysis of nurse practitioners decision-making techniques concerning coronary heart disease risk.

Chapter Three

This chapter describes the methods that were used to explore advanced registered nurse practitioner judgments of coronary heart disease risk factors in patients. The sample selection, data collection, and instrumentation are described. This is followed by a discussion of the research procedures and data analysis methods used for the study.

Research Design

This study used a three-group pretest-posttest experimental design. Participants were randomly assigned to one of three groups: (1) comparative feedback condition; (2) Framingham Heart Study CHD risk prediction worksheet condition; and (3) control group. The comparative feedback condition participants were given information concerning how Framingham weighted the eight CHD risk factors compared to how the subjects assigned weight to each CHD risk factors. The Framingham Heart Study CHD risk prediction worksheet feedback consisted of the actual regression weights of the eight CHD risk factors according to the updated Framingham Heart Study. For each policy-capturing (PC) experimental group the intervention was given after the completion of the first PC task. (The PC task, comparative feedback, and Framingham worksheet are described in forthcoming text). The control group simply completed the PC task twice, one week apart.

Participants in both experimental groups completed the same policy-capturing (PC) task twice, separated by approximately one week; the difference between the two conditions centered on whether having this information made a difference and if so did the comparative feedback or Framingham worksheet group enhance their agreement, achievement and insight more than the control group. This design allowed the researcher to describe ARNPs' risk judgment processes as stated in Aim 1, and to assess the effects that comparative feedback had on improving judgment agreement, achievement, and insight as stated in Aim 2.

Sample

Sixty family or adult specialty nurse practitioners affiliated with the USF College of Nursing, representing five counties located within the southwest region of the Florida were recruited to participate in the study.

Policy capturing is an ideographic technique that requires many judgments from one participant. More crucial than the number of participants is the number of judgments made by each participant. To test the hypothesis that exposure to different forms of information regarding clinical assessment of CHD risk would alter judgments and cue weights power was set at .80 with an alpha of .05. Twenty participants per condition were considered adequate.

Materials

Policy Capturing Task

The materials for use in this study were presented to participants in a short booklet. Booklets contained a cover page describing the purpose of the study and instructions for the judgment task, a section asking participants to indicate how they assigned importance to the cues during the judgment task and whether or not they would refer each patient to a cardiologist, and a section requesting basic demographic information. (Pilot testing indicated that the booklet would take between 20 and 60 minutes to complete).

To capture the judgment policy used by each participant to assess risk of CHD, a series of 70 unique patient profiles were constructed by the primary investigator using the eight variables identified by the Framingham Heart Study: gender, age, smoking status, total cholesterol level, HDL level, systolic blood pressure, the diagnosis of diabetes and a diagnosis of left ventricular hypertrophy. These variables (cues) were selected because they form the basis of the "gold standard" to assess patient risk for CHD (Anderson, Wilson, Odell & Kannel, 1991). Anderson et al. used data from 5,573 patients that were followed over a 12-year period to construct a complex nonlinear model for estimating risk from several known and suspected risk factors. Anderson et al. then used these equations to produce prediction rules or "worksheets" for use by practitioners in clinical settings. The worksheets provided clinicians with algorithms or prediction rules for estimating patient risk of CHD using a simple tallying method to estimate patient risk. Male and female patients are assigned various points based on their age and presence of other risk factors (smoking, left ventricular heart failure, diabetes status, cholesterol level, etc). Worksheets formed one of our experimental interventions.

Seventy descriptive profiles made up of eight cues (Figure 3) were given to each participant. Given the number of profiles each nurse practitioner had to review this brief format seemed appropriate to minimize respondent fatigue and boredom.

Figure 4 Example of Patient Profile

Patient Profile #1

Age: 42

Gender: Female

Total Cholesterol: 188

Smoker: No

HDL: 45

Systolic Blood Pressure: 110

Diabetes: Yes

Left Ventricular Hypertrophy: No

On a scale form 0% to 100%, how would you rate the likelihood that this patient will have a heart attack within the next 10 years? ______

Would you refer this patient to a cardiologist? YES or NO

Self-report of Cue Importance

Following completion of the policy-capturing task, participants were asked to specify how much importance they placed on each cue type during the task by assigning 100 points among the eight cues (age, gender, systolic blood pressure, total cholesterol, high-density lipoprotein, smoking status, diabetes, and left ventricular hypertrophy). Essentially the participant stated how much weight or values they assigned to each cue. Values had to total to 100 points. These data were compared to the subjective weights resulting from the policy-capturing task to determine the degree of insight each participant had into his or her judgment process.

Demographic Information

Basic information was collected on participants that included their age, gender, years of practice as an ARNP, and area of specialization. This information was used to evaluate regular patterns in cue utilization, judgment agreement, and participant's insight into their judgment processes as functions of these variables.

Institutional Review Board

The study proposal was reviewed and approved by the University of South Florida Institutional Review Board. The recruitment material consisted of a written announcement that was sent via electronic mail to all USF affiliated ARNP preceptors and their colleagues. The announcements contained the name and contact information of the primary investigator and encouraged potential participants to call with questions or comments. The participants did not write their names on any materials except the informed consent.

Procedure

Session 1.

The investigator contacted participants and scheduled appointments to discuss the study. After explaining the study and obtaining informed consent, participants were presented with the judgment booklet. The participants were asked not to place their name on the booklet to maintain confidently. Participants were randomly assigned to the comparative feedback, Framingham worksheet, or control group; the random assignment was determined by a computer randomization equaling 20 participants in each group. Participants in the comparative feedback group completed the policy capturing (PC) task and then were given the comparative feedback. They were seen again in one week to complete the PC task a second time. Participants in the Framingham worksheet group were provided the Framingham Heart Study Risk Prediction worksheet after completion of the first PC task and were seen again in one week to complete the PC task. Participants in the control group simply completed the PC task twice, one week apart. All participants were debriefed and thanked for their participation, and their name was added to a raffle to win a gift certificate to a local restaurant.

Figure 5 Example of Comparative Feedback

How important was each cue as you formed your estimates of CHD risk?

Divide 100 points among the cues below. Assign the most points to the cue(s) you relied on the most.

_____ Gender
_____ Age
_____ Systolic Blood Pressure
_____ Left Ventricular Hypertrophy
_____ Total Cholesterol Level
_____ High Density Lipoprotein Level
_____ Smoker
_____ Diabetes

_____ TOTAL

Actual importance of each cue

8.6 Gender
22.2 Age
10.4 Systolic Blood Pressure
20.1 Left Ventricular Hypertrophy
6.1 Total Cholesterol Level
11.4 High Density Lipoprotein Level
9.5 Smoker
11.6 Diabetes

100 TOTAL

The investigator was available to answer any questions. After the participant completed the booklet an appointment was scheduled approximately one week later.

Session 2.

Approximately one week following session 1, the investigator met with each participant to repeat the PC task. To minimize attrition of the study participants the primary investigator traveled to their place of employment, designated work site, or other location the participant chose for completion of the informed consent and questionnaires.

Analysis Plan

Aim 1: Describing Judgment Policies

Social judgment theory provided the framework for conducting analyses and constructing feedback. Each participant's judgment of risk was analyzed separately using a SPSS regression procedure. Standardized regression coefficients were interpreted as estimates of importance weights. To obtain the actual CHD risk weights, the updated Framingham Heart Study CHD risk prediction equation for the 70 profiles were regressed onto the eight cues and transformed onto the 100-point scale described above.

Research Questions

1a - How do ARNPs distribute importance weights among the various cues as they judge risk? Examining the semi-partial correlation coefficients obtained from each participant and comparing the group means was used to answer this question.

1b – What is the agreement between ARNPs' judgments as compared with actual Framingham estimated risks? This question was answered by expressing agreement as the degree of discrepancy between judged risk and actual risk.

1c - How well did a linear model represent ARNPs' judgment policies? To answer this question the degree of cognitive control exhibited by each participant was assessed. The multiple correlation R_s was inspected from each policy equation.

1d - How much insight did ARNPs have into their judgment processes? This question was addressed by comparing the subjective cue weights obtained from each participant's policy equation with his or her self-reported cue importance weights. The degree of consistency between these two sets of weights was expressed by using a skill score. The closer the value was to one, the greater the degree of insight. These values were also aggregated to provide a single index for the sample of ARNPs examined here.

Aim 2: Assessing the Effects of Cognitive Feedback on ARNPs' Judgment of Risk

The three-group pretest-posttest design permitted testing the hypotheses regarding the influence of the comparative feedback provided. An analysis of variance (ANOVA) was used to determine if there were significant differences from pre-to-posttest across the three conditions. Hypothesis testing used an alpha value of .05 to evaluate differences among the participants in each experimental manipulation group compared to the control group. Again, the hypothesis of this study stated that there would be a significant difference between the two intervention groups as compared to the control group.

Hypothesis 2a - Participants assigned to a manipulation group (comparative feedback or Framingham worksheet) prior to completing the second PC task would show increased agreement and achievement in their risk assessments compared to participants who did not receive feedback prior to the second PC task. An ANOVA was conducted to compare groups on the agreement of each participant's judgment policy relative to the Framingham-estimated actual risk.

A second ANOVA was conducted to compare group differences on participants' achievement index. This index was calculated as the Pearson correlation coefficient, but was transformed using Fisher's r to Z adjustment prior to analysis. These achievement indices from the first PC task were treated as a covariate and the indices from the second PC task served as the dependent variable.

Hypothesis 2b - Participants that were assigned to a manipulation group (comparative feedback or Framingham worksheet) prior to completing the second policy-capturing task will show greater insight into their judgments of risk as compared to participants who do not receive feedback. An ANOVA was conducted to compare group differences between each participant's subjective cue weights and his or her self-reported cue importance weights.

The next chapter will discuss the results of the study concerning how accurate nurse practitioners were in their importance weights of each cue, the amount of cognitive control exhibited, the amount of insight exhibited by NPs, how well they agreed with the Framingham Heart Study risk prediction equation, and how well the NPs judgment model agreed with the Framingham Heart Study's risk prediction model.

Chapter Four

Results

Chapter four includes the analyzed data to address the research questions and hypothesis described in chapter three. The following sections include a demographic description of the sample, evidence detailing how well an additive linear model captured nurse practitioners' judgment policies, information on the agreement between nurse practitioners' judgments compared to the Framingham estimated CHD risks (ecology), the distribution of nurse practitioners' importance weights among the eight cues, and the participants' insight into their judgment processes.

Sample of Judges

A total of 99 nurse practitioners were contacted for recruitment, sixty nurse practitioners agreed to participate and completed the study; 39 refused participation or did not respond to recruitment calls. The final sample consisted of 58 females and two males. Nurse practitioner specialties included two acute critical care, 18 adult, 33 family, three geriatrics, and three oncology nurse practitioners. The mean age of the subjects was 49 years (SD = 6.65). The range of age was 33 to 65 years (Table 1). Years of work experience ranged from one to twenty-nine years, with the largest percentage of years worked being six years (16.7%). The second largest percentage of years worked for this sample was eight years (11.7%). The mean years worked were 8.44 years, (SD = 6.12). The majority of respondents held a nurse practitioner certification in the following categories: family (53%), adult (30%), geriatrics (5%), oncology (5%), acute critical care (3.3%), and women's health (1.7%).

Performance of All Judges at Time 1

A multiple linear regression analysis on the 70 cases was conducted to estimate the predictability of the judgment task. The R_e was .96, confirming that the Framingham CHD risk prediction equations (Anderson's et al. 1991) could be adequately represented by an additive linear regression model. A relatively high value of R_e indicates that if nurse practitioners used an additive linear model to form judgments of patient risk and if they assigned cue weights proportional to those used in the regression model, then it would be possible for them to obtain high degrees of achievement *(*r_a*)* and agreement *(G)* on the judgment task. The r_a (achievement) index reveals the amount of agreement between the judges and the Framingham CHD risk prediction equation. Achievement ranged from .44 to .87 (average $r_a = .70$). The R_s index measures the amount of cognitive control a participant had concerning their judgments and how well an additive linear model captures the judgment policies of the subject. The participants showed R_s values that ranged from .72 to .95 (average $R_s = .88$) indicating an additive linear model adequately captured the practitioners judgment policies.

The *G* index indicates the amount of agreement between the additive linear model of the Framingham CHD risk prediction equation and the additive linear model of the judge. The *G* index ranged from .57 to .97 (average $G = .85$).

Table 1 Sample Composition

Characteristics	Comparative-Feedback (%)	n	Worksheet Feedback (%)	n	Control (%)	n	Total (%)	n
Gender								
Male	(0)	0	(0)	0	(10)	2	(3.3)	2
Female	(100)	20	(100)	20	(90)	18	(96.6)	58
NP Specialty								
Acute Critical Care	(5)	1	(5)	1	(0)	0	(3)	2
Adult	(35)	7	(25)	5	(30)	6	(32)	19
Family Practice	(45)	9	(60)	12	(55)	11	(53)	32
Geriatrics	(10)	2	(5)	1	(0)	0	(5)	3
Oncology	(5)	1	(0)	0	(10)	2	(5)	3
OBGYN	(0)	0	(5)	1	(0)	0	(2)	1
Years Worked								
1-5 years	(30)	6	(30)	6	(35)	7	(32)	19
6-10 years	(30)	6	(40)	8	(40)	8	(42)	25
11-15 years	(20)	4	(5)	1	(20)	4	(15)	9
16-20 years	(10)	2	(10)	2	(5)	1	(8)	5
21-26 years	(0)	0	(5)	1	(0)	0	(2)	1
27-29 years	(5)	1	(0)	0	(0)	0	(2)	1

The *C* index indicates the strength of correlation among residuals from judgment models and the additive linear model of the Framingham CHD risk prediction equation. A large value suggests that some aspects of judges' use of cues were not captured by the additive linear model. Results for participants revealed a range from -.38 to .55 (average $C = .01$). This suggests that some clinicians may be using more complex judgment policies than an additive linear model.

Another useful index of agreement is Murphy's (1988) skill score. A skill score provides insight into properties of the environmental/information system and the cognitive system within nurse practitioners judgments; it shows how those properties interact to influence judgment skill. The two components of skill score are conditional and unconditional bias.

Conditional bias refers to the standard deviation of the judgments compared to the standard deviation of the Framingham risks (Murphy, 1988). For example: if a practitioner is sensitive to extreme cue values (such as a systolic blood pressure of 200 mmHg) her judgments of risk will be more varied than those predicted by the Framingham risk equations. This type of bias can cause an error in prediction if the variable being judged does not have a strong relationship with risk.

The second type of bias is unconditional bias, which reflects any mis-match between the mean of the judgments and the mean of the Framingham risks. For example, a nurse practitioner's ranking of patient risk may match those from Framingham but she overestimated risk for all patients by 10. Thus her skill score would show unconditional bias.

Insight was measured by asking participants to subjectively weigh each CHD risk factor used in the lens model compared to the R_s value = .88 at Time 1. For every subject, the R = .37 for the subjective equation was significantly lower than the R_s, which suggest that the nurse practitioners' insight was not modest. The mean skill scores at Time 1 were 34.8 (SD = 15.1) and the mean for the Framingham equation was 14.4 (SD = 12.6). To determine whether unconditional bias or conditional bias was the bigger source of error the within subject average rating and within subject standard deviation were correlated with skill scores. (The correlation of skill scores and average ratings was - .99 the correlation of skill score and standard deviation = -.62). These correlations suggest that elevation (overestimation of risk) was the bigger source of error.

Hypothesis Testing

It was hypothesized that nurse practitioners' agreement and achievement would increase if they were exposed to one of the experimental interventions as compared to the control group. This hypothesis was tested using a 3 x 2 (condition by time) ANOVA. The key test of significance was the interaction that addressed the general question, Was the change in the dependent variable the same for all three conditions? Also of interest was the main effect of change over conditions. This test addressed the question: Did the dependent variable change over time for the entire sample? It was also hypothesized that nurse practitioners exposed to the experimental interventions would have greater insight into their judgment policy for CHD risk in the primary care patient versus the control group.

Changes in r_a, R_s, and G

The agreement between the nurse practitioners' assessment of risk and the Framingham CHD risk prediction equation may be expressed as achievement *(r_a)* the correlation between a judge's ratings and the criterion values. Achievement for Time 1 ranged from .44 to .87 (average r_a = .71). Achievement for Time 2 ranged from .21 to .96 (average r_a = .75) (Figure 5). The main effect for time was $F(1, 57) = 4.22$, $p < .05$, indicating that for the entire sample, agreement improved. There was no significant interaction indicating that the intervention groups did not differ significantly than the control group.

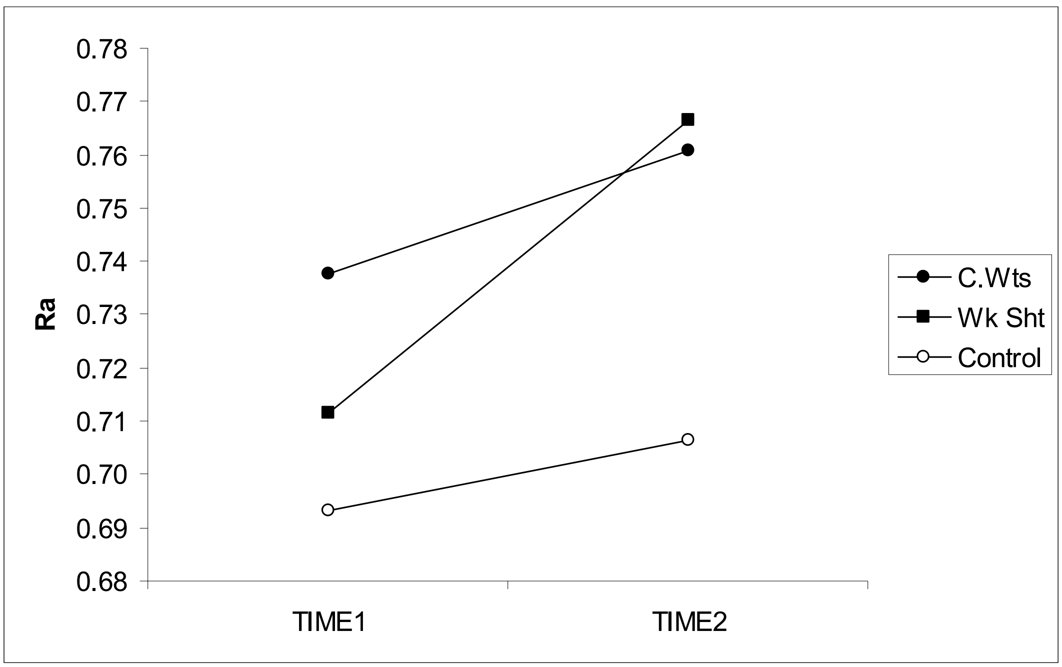


Figure 6 Amount of agreement among ARNPs judgments & FHS Risk Prediction Equation
C.Wts = Comparative Feedback; Wk Sht = Framingham Heart Study CHD Risk Prediction Worksheet; Control = Control Group

The average R_s value (index of cognitive control) across judges was .88 and ranged from .72 to .95, suggesting that the judgment policies were adequately captured by the additive linear model. Figure 6 indicates that the main effect for time was significant $F(1, 57) = .75$, $p > .05$; however no significant interaction among conditions was present.

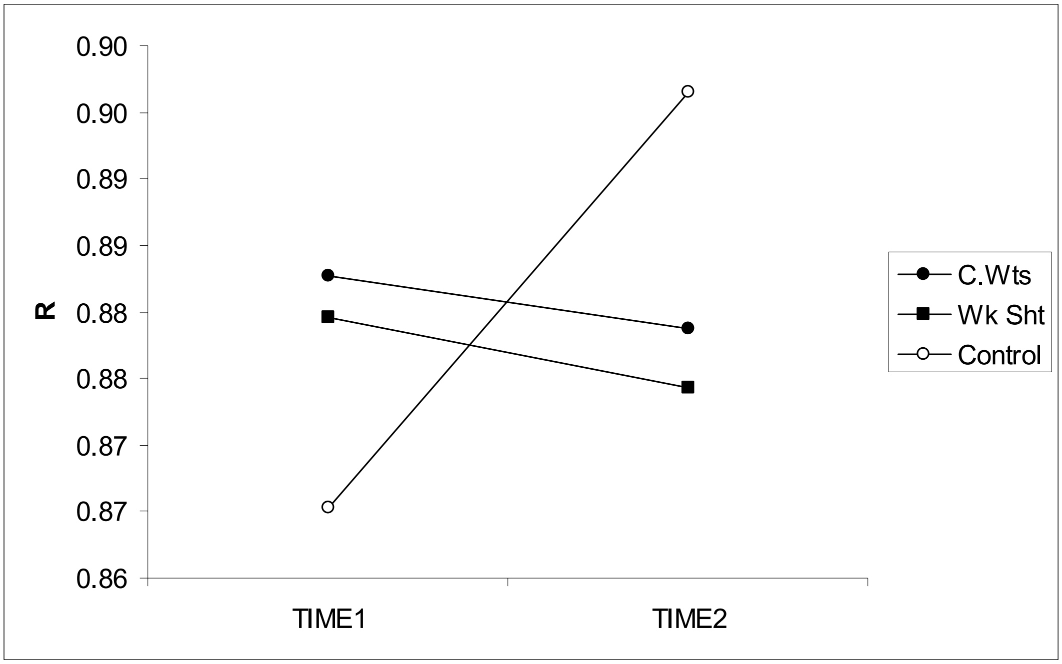


Figure 7 Cognitive Control among ARNP Judges

The degree of agreement between the additive linear model of the Framingham equations and the nurse practitioners' judgment model, (*G* index), averaged .85 and ranged from .50 to .99 suggesting that the two additive linear models agree. As indicated in Figure 7, there was a significant main effect for time $F(1, 57) = 9.29$, $p < .05$ and interaction by condition $F(2, 57) = 3.30$, $p < .05$. Follow up tests revealed that both intervention groups showed significant increases in *G* [$F(1,57) = 5.37$, $p < .05$] for both the comparative weight condition and $F(1, 57) = 10.45$, $p < .05$ the Framingham worksheet condition. The control group did not change significantly.

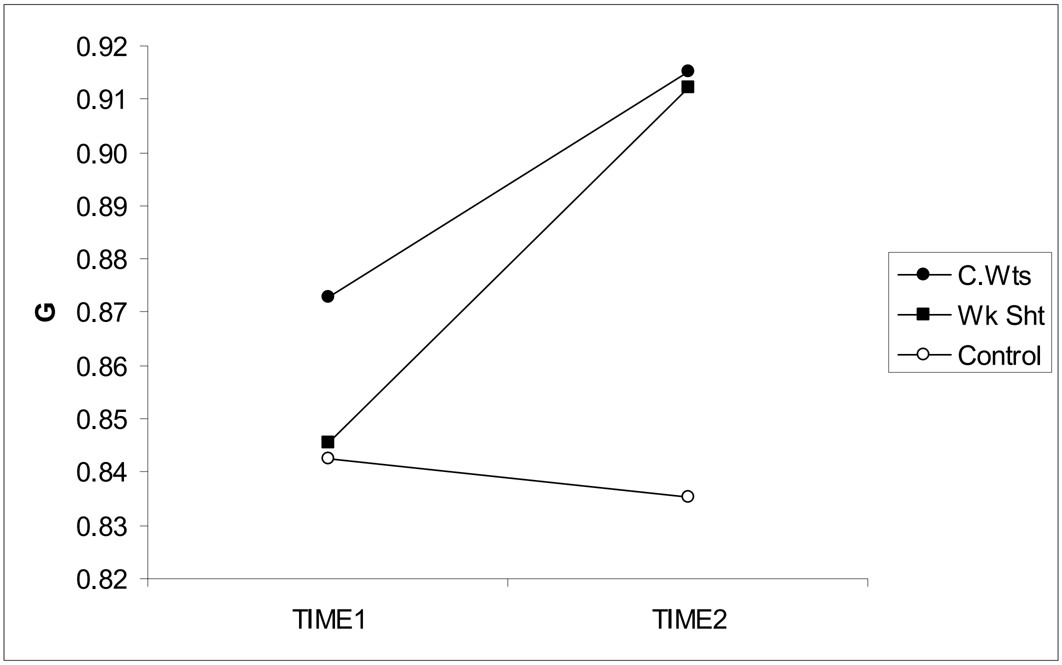


Figure 8 Agreement among the Judges' Model and the Simple Additive Linear Model of the Framingham Equation

Comparing the components of the skill scores from Times 1 and 2 showed how nurse practitioners' agreement with Framingham equations improved overtime. The main source of disagreement with the Framingham equations at Time 1 was unconditional or elevation bias. On the average, nurse practitioners overestimated risk. Figure 8 shows that the entire sample showed less unconditional bias at Time 2 ($F(2, 57) = 9.85$, $p < .01$) and that the reduction for the Framingham worksheet condition was greater than the other two conditions ($F(1, 57)$ = 3,43, $p < .05$). Figure 8 shows unconditional bias (elevation) or the mean estimate of risk. Figure 9 indicates the standard deviation for risk estimates or conditional bias (scatter). There was a significant main effect $F(1, 57) = 9.85$, $p < .05$ and interaction $F(2, 57) = 3.43$, $p < .05$ for unconditional bias (elevation). There also was a significant main effect $F(1, 57) = 36.22$, $p < .01$ and interaction $F(2, 57) = 5.42$), $p < .05$ for conditional bias (scatter).

Figure 9 Unconditional bias (elevation) from Time 1 to Time 2

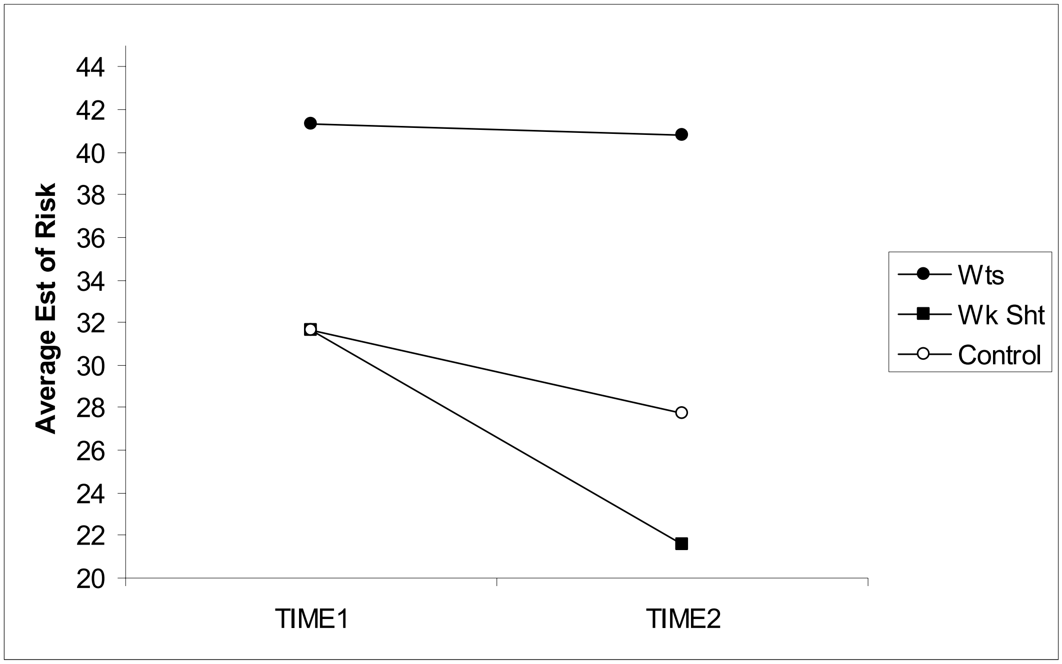
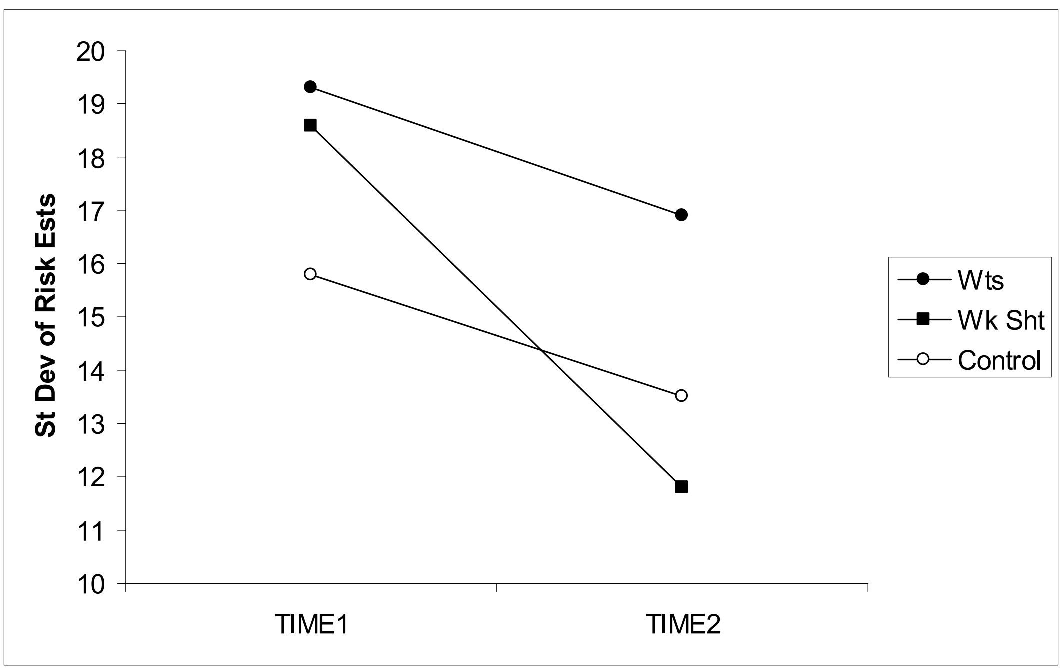


Figure 10 Conditional bias (scatter) from Time 1 to Time 2



Distribution of Importance Weights Among the Eight Cues

The nurse practitioners varied in their distribution of cue importance weights as they estimated patient risk. The cue weights were estimated from semi-partial correlations (r_{sp}). Generally, sample-based correlations are not normally distributed except when the population parameter value they are estimating is zero (Cooksey, 1996). Therefore the appropriate correction for non-normality of correlation coeffecients is the Fisher r to z_r transformation (Cooksey, 1996).

To assess the systematic differences in the eight cue weights among judges, a multi-level regression analysis was performed. At level one, risk assessments were regressed onto the eight cues. Demographic characteristics of the judges (gender, age, years of work experience, and area of specialization) along with their ratings of the realism of the patient profiles were treated as level two variables. The multi-level analysis was used to address whether demographic differences among judges could be explained by the observed variation in each cue's weight.

Each cue was individually evaluated and compared from Time 1 to Time 2 for statistically significant improvement in their judgment of risk as compared to the Framingham CHD risk prediction equation. Each analysis was also compared by group (comparative feedback, Framingham worksheet, or control). The results are as follows: As indicated in Figure 10 subjects did not show a significant main effect $F(1, 57) = 3.41$, $p > .05$ or interaction in how they weighed the cue gender.

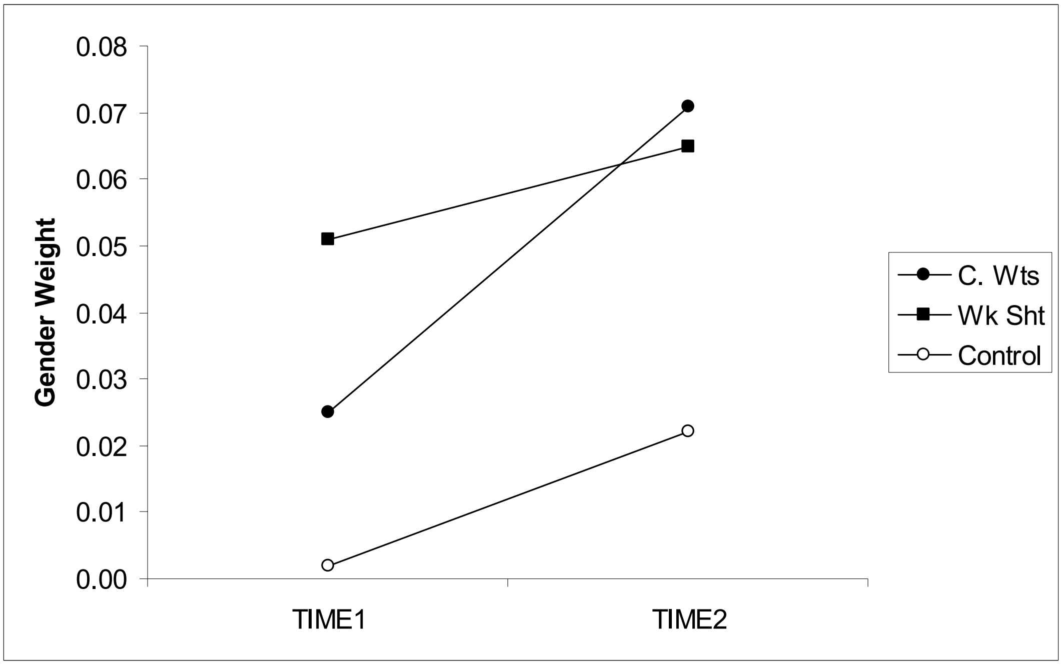


Figure 11 Judges assigned weight to Gender from Time 1 to Time 2

In Figure 11, the experimental manipulation groups had a significant main effect $F(1, 57) = 17.20$, $p < .001$ and interaction $F(2, 57) = 3.59$, $p < .05$ for age. The participants significantly increased the weight they assigned to the cue, age, from Time 1 to Time 2 respectively. The control group did not significantly change their assigned weight for the cue age from Time 1 to Time 2.

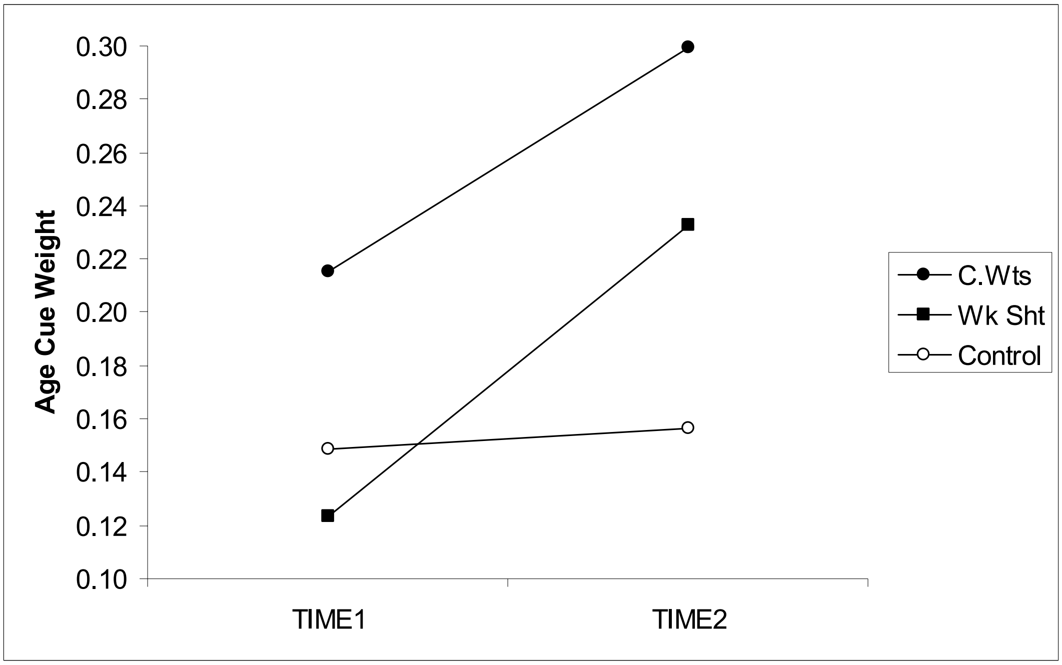
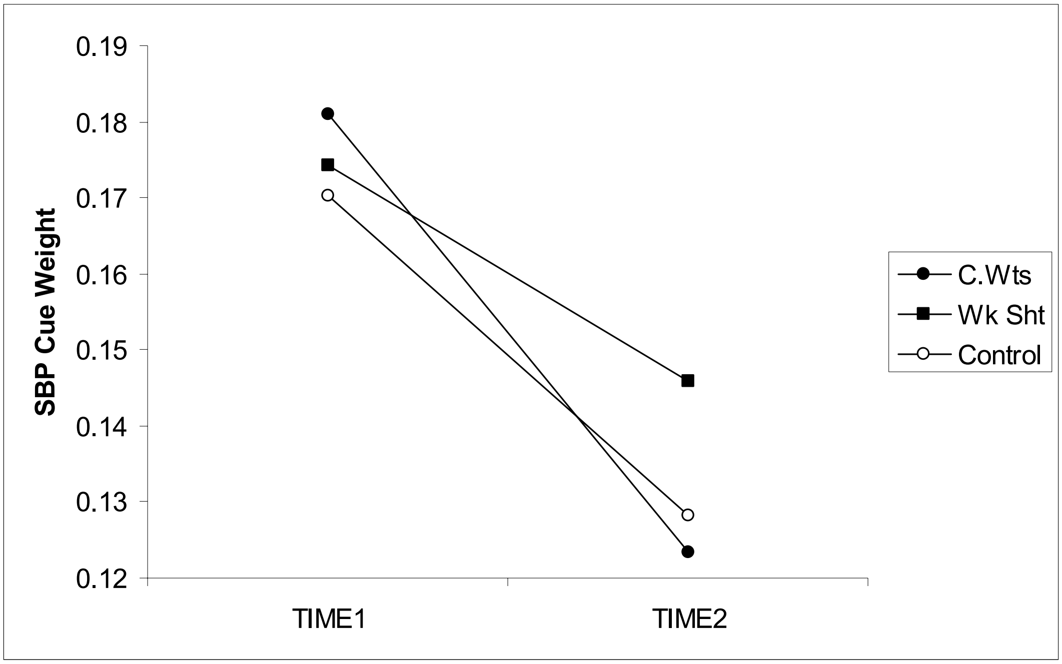


Figure 12 Judges assigned weight for AGE from Time 1 to Time 2

For the systolic blood pressure cue there was a significant main effect $F(1,57) = 12.57$, $p < .05$, but no interaction among the groups was identified as shown in Figure 12.

Figure 13 Judges Assigned Weights for Systolic Blood Pressure from Time 1 to Time 2



There was not a significant interaction between groups for the cue LVH as shown in Figure 13, however the main effect was significant F(1, 57) = 5.54, $p < .05$.

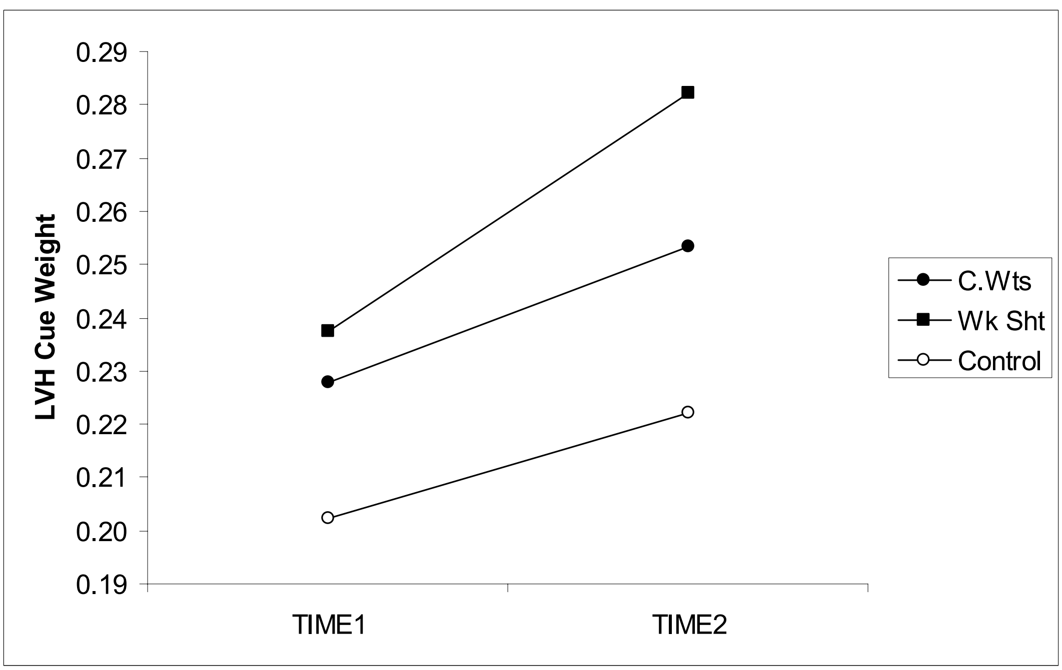


Figure 14 Judges assigned weights for LVH from Time 1 to Time 2

The cholesterol cue did not show a significant main effect $F(1, 57) = 2.62$, $p > .05$ or interaction $F(2, 57) = 3.12$, $p > .05$ among groups as indicated in Figure 14. The sample mean for Time 1 was 0.15 and Time 2 was 0.10 with a difference of 0.13; the effect size was moderate at .10.

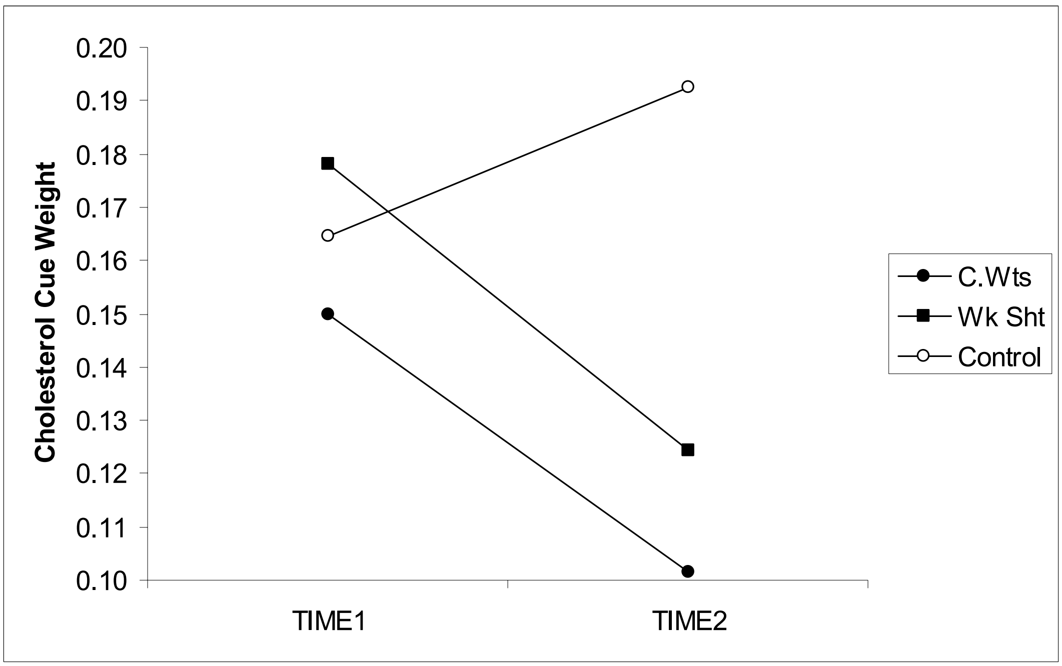


Figure 15 Judges assigned weight for cholesterol from Time 1 to Time 2

The HDL cue results indicated there was not a significant main effect $F(1, 57) = .38$, $p > .05$ or interaction (see Figure 15). No significant main effect $F(1, 57) = 1.55$, $p > .05$ or interaction was noted for the cue smoking status as indicated in Figure 16. The results for the last cue of diabetes status indicated a significant main effect $F(1, 57) = 5.98$, $p < .05$ and interaction $F(2, 57) = 6.38$, $p < .01$ among groups as displayed in Figure 17. The participants exposed to the Framingham worksheet manipulation significantly increased the weight they assigned to the cue diabetes $F(1, 57) = 15.18$, $p < .01$; the comparative feedback and control groups did not significantly change their weight assignment from Time 1 to Time 2 respectively $F(1, 57) = 2.21$, $p > .05$; $F(1, 57) = 1.31$, $p > .05$.

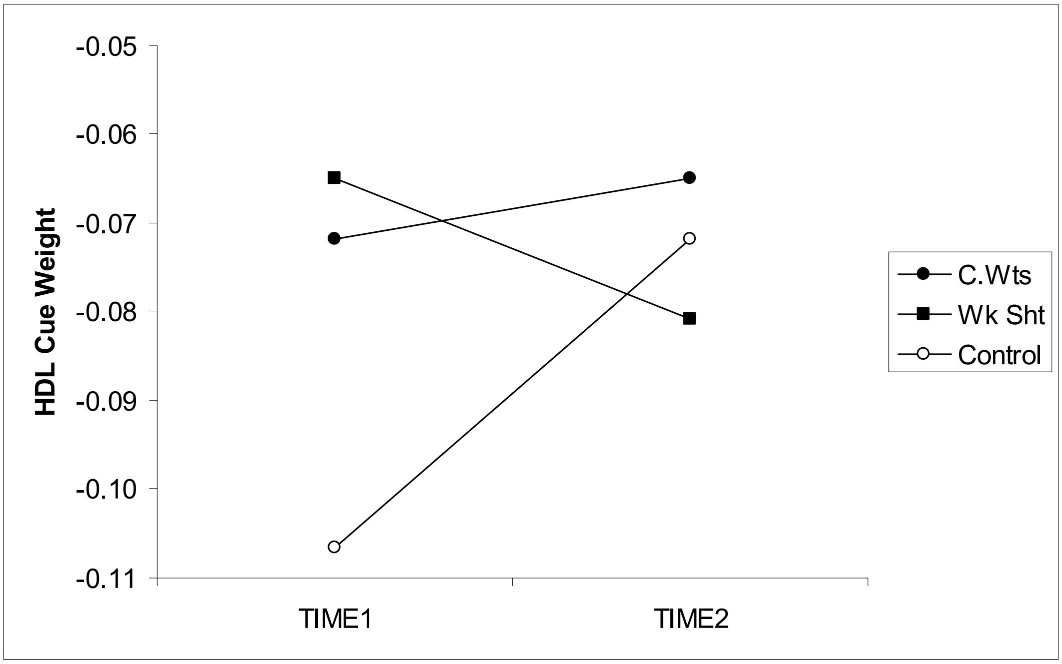


Figure 16 Judges assigned weight for HDL from Time 1 to Time 2

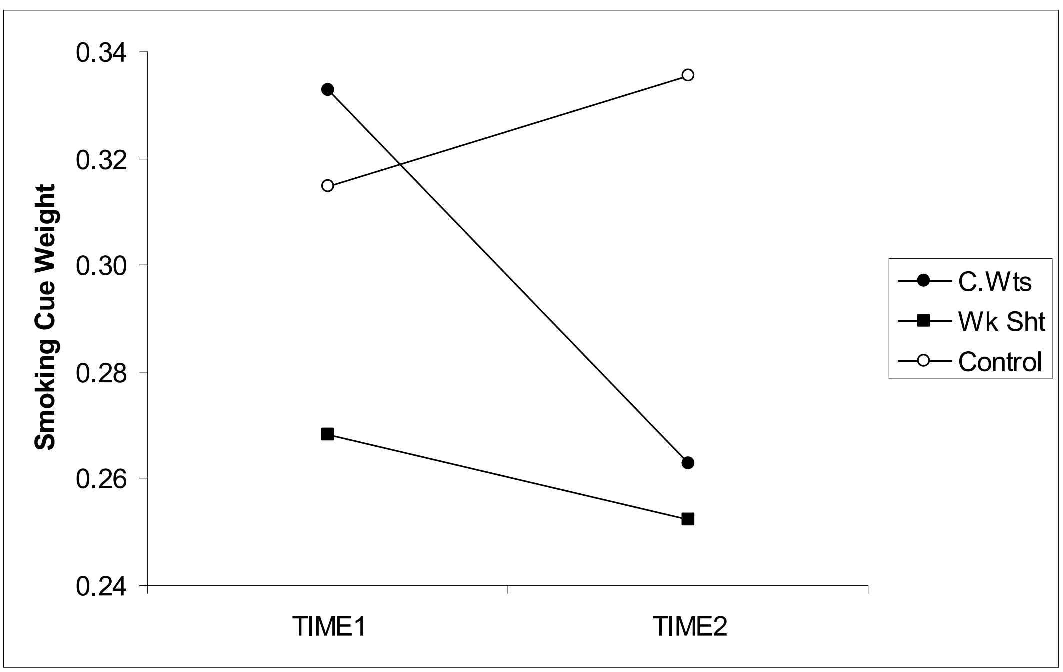


Figure 17 Judges assigned weight for smoking status from Time 1 to Time 2

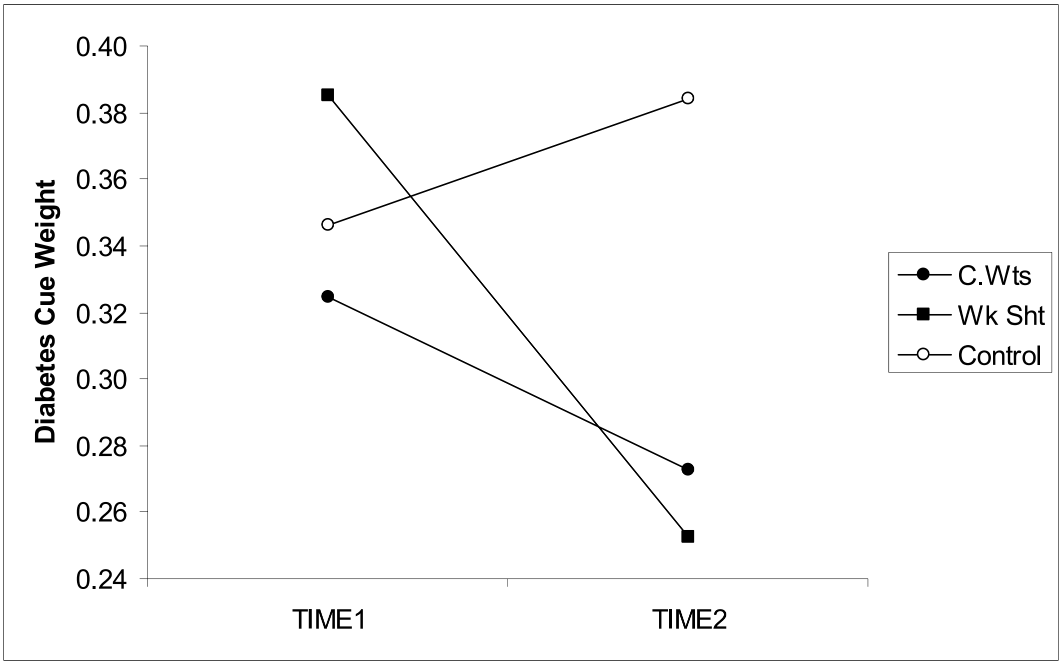


Figure 18 Judges assigned weight for diabetes status from Time 1 to Time 2

Summary

The data was analyzed to test the hypotheses that nurse practitioners receiving an experimental intervention (Comparative feedback and Framingham education) would show better agreement and insight in judgment when compared to a control group. The investigator found that nurse practitioners in the Framingham worksheet condition did show an increased amount of agreement between their judgment model and the Framingham CHD equations, but insight into their own judgment processes did not change from Time 1 to Time 2.

It was also hypothesized that providing nurse practitioners with information about the weight of cues as determined by the Framingham CHD risk prediction equation would modify their cue weights to be more in line with the Framingham equation model. There was some evidence to support this hypothesis. The cues that showed significant interactions were age and diabetes. The cues that showed significant main effects were age, systolic blood pressure, left ventricular hypertrophy, and diabetes.

Chapter five discusses the analyzed results of nurse practitioners decision-making process and why certain cues were significant while others were not. Furthermore, it will discuss the limitations, implications for nursing and future research for decision-making studies concerning nurse practitioners.

Chapter Five

Discussion

The nurse practitioners participating were affiliated with the local university. Recruitment was performed in person, via telephone, or electronic mail. Ninety-nine nurse practitioners were approached for participation and 60 agreed to participate in the study. Typically nurse practitioners that refused participation verbalized a fear of not performing well on the task or not feeling comfortable with properly assessing coronary heart disease risk factors. Though many of the NPs that refused participation did work in primary care clinics, they verbalized that they did not routinely treat cardiac disease and felt uncomfortable taking part in a heart disease assessment study. A small percentage of refusals were due to lack of time. On the average the nurse practitioners were middle-aged to older adults who had been practicing an average of 29 years. This was a relatively small convenience sample from five counties within a geographic region of the Southeastern United States and may not be representative of the entire country.

Performance of Judges for Time One

A multiple linear regression analysis on the 70 cases was conducted to estimate the predictability of the judgment task. The Framingham Heart Study risk prediction equation was compared to the nurse practitioners judgment model to assess the amount of cognitive control each judge had in their decision-making along with assessing how well an additive linear model captured NPs judgments. The nurse practitioners' judgment model indicated that their policy capturing methods were successfully captured for assessment of patient risk for coronary heart disease and they had adequate control in their decision-making. Nurse practitioners' functioning on the task was of reasonable quality when compared to the ecology. They could have functioned well on the tasks due, in part, to the fact that the cues were related to the criterion in straight forward linear ways and that the cues were selected a priori, based on relevance.

Achievement (r_a) was analyzed to determine how well the nurse practitioners agreed with the Framingham CHD risk prediction equation. This was important because Social Judgment Theory is used to evaluate the connection between the individual's judgments and ecological criterion values, namely, achievement. Nurse practitioners' judgments of patient risk for CHD showed considerable agreement with the Framingham's gold standard for making such estimates. The results did not show a significant increase in the amount of agreement by time or condition; however, there was an increasing trend from Time 1 to Time 2, especially with the intervention groups. This is an expected finding considering the control did not receive education between Time 1 and Time 2. The achievement values reported for Time 1 and Time 2 supported nurse practitioners' success at judging patient risk for CHD based on the eight highly relevant cues.

The *G* index measures how well the judges' model (nurse practitioner) agreed with the ecology model (Framingham Heart Study risk prediction model). During the evaluation of *G* index, it was determined that nurse practitioner's judgment policies were reasonably high from Time 1 to Time 2. There was a significant increase in agreement between the judges' model and the Framingham Heart Study risk prediction model by time and condition. As expected the two intervention groups that received education did significantly increase their agreement, while the control group remained the same over time. However, the change was not consistent among the three groups. Both intervention groups had a significant increase in their agreement with the Framingham CHD risk prediction model, but the Framingham worksheet group showed a greater degree of agreement than the comparative feedback group. This could be the result of the greater amount of detailed CHD risk information that was covered on the Framingham worksheet than simply giving the judge comparative weights for each risk factor alone. An overall conclusion is that nurse practitioners may perform better with more detailed and complex education information than a synopsis type format.

A skill score is indicative of how much insight one may have into their decision-making judgments. By measuring the participant's skill score it was revealed that on average most of the nurse practitioners overestimated a patient's risk for the development of CHD within the next 10 years. The overestimation was explained by unconditional bias in their judgment. The nurse practitioners exposed to the Framingham worksheet were the only group to significantly decrease their amount of unconditional bias and conditional bias from Time 1 to Time 2. For example, anecdotal evidence obtained during data collection revealed that some judges would admit to assigning a higher percentage of risk for CHD to patients with a diagnosis of LVH due to having an "already damaged" heart. The decrease in both unconditional and conditional bias for the one intervention group (Framingham worksheet group) could be explained by the amount of detailed information given within the worksheet. Specific gender and age related information was obtained from the Framingham worksheet along with the percentage of probable risk within the next 5 and 10 years. The highest probability of having a CHD event in the next 10 years was 42% on the risk prediction worksheet; however, some of the judges gave risk rating up to 100%. The comparative feedback only gave the judge's subjective weighted risk for each of the eight risk factors compared to the Framingham weights for each risk factor, and the control group did not significantly make a change between Time 1 and Time 2.

After completing the 70 patient profiles the judges were asked to subjectively weigh each cue for importance of risk. The purpose of this task was to compare the judges' subjective weight importance value to the cognitive control value, which would indicate if the judge rated risk within the scenario booklet as they rated the importance of each cue at the end of the task. The results indicated that the subjective weight importance was much lower than their cognitive control suggesting that nurse practitioners have only modest insight into their judgment policies. This finding has been supported in other research concerning insight of professional decision-making (Reilly & Doherty, 1992; Reilly & Doherty, 1989; Stewart & Lusk, 1994). Nurse practitioners did no better or worse in their amount of insight than professions studied previously; the type of judges studied included but was not limited to physicians, accountants, weather forecasters, college students and college professors.

Distribution of Importance Weights Among the Eight Cues

The eight cues evaluated were gender, age, systolic blood pressure, left ventricular hypertrophy, cholesterol, HDL, smoking status, and diabetes status. Each cue was individually evaluated and compared from Time 1 to Time 2 for a statistically significant improvement in their judgment of risk as compared to the Framingham CHD risk prediction equation. Gender was the least weighted cue out of all risk factors across all groups by the nurse practitioners (Framingham weighted gender seventh out of eight in risk factor importance). The comparative feedback condition changed the importance rating for gender from Time 1 to Time 2 in the correct direction; however this was a non-significant change. This could be explained by the fact that the judges in this group were able to compare Framingham's estimation of gender risk with their own and gave the cue more weight at Time 2, but did not change their real view of importance for this cue. The Framingham worksheet condition broke the risk factors down by gender when predicting percentage of 5- or 10- year risk. It was the expectation that this group would significantly increase their risk rating for gender from Time 1 to Time 2 due to the more complex education given. For example, the Framingham CHD risk prediction worksheet broke the gender cue down in the following way, a woman with diabetes was given 6 points whereas a man with a diagnosis of diabetes was given 3 points. This can be interpreted that women have double the risk of having a CHD event if they are positive for the risk factor, diabetes. However, the Framingham condition did not judge the gender cue any differently than the control group. This indicates a need for further education on the importance of gender differences concerning coronary heart disease. An emphasis has been placed in the last 5 to 10 years that women experience different coronary heart disease symptoms at different times in life than men. This study only confirms the need for further continuing education and possible curricular changes concerning this risk factor.

Age was the sixth most weighted risk factor at Time 1 and increased in weight at Time 2, the amount of importance increased over time and by condition. The intervention groups significantly increased their weight of risk; however the control group stayed the same over time. There was a stronger relationship with change over time for the Framingham worksheet group. This finding could be explained by the emphasis the Framingham CHD prediction worksheet placed on age by gender, the older a person's age, the more risk points they will receive for risk of a CHD event occurring. It is not surprising that the control group which received no education between tasks did not change their risk assessment by time. Framingham weighted age as the most important coronary heart disease risk factor out of the eight.

Systolic blood pressure was the fourth most weighted risk factor at Time 1; however it decreased in weight at Time 2 for all groups. The comparative feedback and control group had the strongest change in risk rating over time. The change with the comparative feedback group may be explained by the format in which the information was given. Referring to the comparative feedback (Appendix A) instrument demonstrates that the judges were shown how they weighed each cue as compared to how the Framingham equation weighed each cue. This group of judges was able to visually compare how much they over-weighed systolic blood pressure at Time 1 and thereby decrease the amount of weight assigned during the Time 2 task. The change in the control group was significant but not as great as the comparative feedback group. This could have been due to learning the task over time or gaining knowledge about systolic blood pressure between tasks. The judges rated left ventricular hypertrophy as the third most important cue for both Time 1 and Time 2. However, there was not a significant interaction among groups. This could be explained by a judge having knowledge that LVH was a significant risk factor for the development of a CHD event and it remained stable overtime and condition. Framingham weighted SBP as fifth most important out of the eight risk factors.

The cues cholesterol, HDL, and smoking status were ranked as fifth, seventh, and second weighted cues with no significant change over time or condition respectively. Framingham weighted cholesterol, HDL, and smoking status as the eighth, fourth, and six most important risk factors out of the eight respectively. The cholesterol cue was overestimated in risk of importance by the nurse practitioners but decreased over time with the exception of the control group. The HDL cue had no change for the intervention groups; however, the control group did increase their weight importance from Time 1 to Time 2. The test for this condition may indicate a slight lack of power and the need to increase sample size to significantly detect the differences among the groups. The nurse practitioners' lack of original knowledge about the normal range for HDL levels at Time 1 could explain why there was a lack of change between the Time 1 and Time 2 tasks. Smoking status at Time 1 was weighted quite high for all groups; however the intervention groups did decrease their weighing of risk over time. The control group actually increased their weight of risk from Time 1 to Time 2. This drop in risk rating can be explained by the education given concerning smoking status for both intervention groups. It is not unlikely that the control group did not change their weight estimate for smoking status due to the fact that no education was given; it also may be considered the most modifiable risk factors for CHD, therefore, viewed as less tolerable by clinicians.

Diabetes was considered the highest rated risk factor among all groups from Time 1 to Time 2 as compared to Framingham that ranked diabetes as the third most important risk factor. There was a change over time and by condition for this cue; however, the only group that significantly decreased their importance weight for risk over time was the Framingham worksheet condition. All subjects overestimated the weight for diabetes; the control group continued to overestimate risk at Time 2 and the intervention groups decreased their weight importance at Time 2. This result can be explained by the educational information supplied to the intervention groups. The control group received no information between tasks, and therefore, did not change their beliefs over time.

Implications for Judgment Researchers

The study demonstrates that an additive linear model did an adequate job of capturing the systematic way that nurse practitioner judges make decisions about CHD risk. The findings gives judgment researchers a representation of how 60 professionals produced judgments and were able to analyze the application of their judgments through the representation of the environmental model. The Social Judgment Theory provides another way of evaluating educational interventions for professionals. Many current evaluations simply focus on changes in knowledge rather than practice. The results of this study may provide not only an estimate of impact concerning correct assessment of risk, but also a source of explanation of when the need for interventions is appropriate. Finally, SJT allows for the development of predictive models, validation and reference to real ecologies as a mean of adding increased value to the analysis of risk.

Limitations

Although the validity of pencil and paper patient profiles has been demonstrated in several studies examining clinical decision making (Fisch, Hammond, Joyce & O'Reilly, 1981; Gillis, Lipkin, & Moran, 1981; Holzworth & Wills, 1999; Rothert, 1982; Smith, Gilhooly, & Walker, 2003), it is possible that the nurse practitioners studied here could weigh patient characteristics differently in practice than they did on our policy capturing task. Only eight CHD cues were used in this study which may not have captured all complex aspects that nurse practitioners may consider when diagnosing and treating a patient for CHD risk. However, this study demonstrates how well the nurse practitioners whom participated in this study performed next to the gold standard of CHD risk prevention and treatment. The patient profiles used here were quite brief and presented in a form not usually seen by nurse practitioners. Although efforts were made to produce a set of patient profiles representative of those used to develop the Framingham CHD risk prediction rule, different case mixes will presumably produce different cue weights.

A second limitation of this study is that other factors such as insurance status and family history were not provided within the scenarios. This information may moderate judgment for profiled patients. Documentation of the thinking/judgment processes of nurses and the critical cues to actions used during actual patient situations could be evaluated.

The sample size was a limitation; it was clear during the analysis of the data that some of the cues may have shown a significant change over time and by condition if the study had more power. The sample consisted of only two men; however, this was not seen as a limitation due to fact that men statistically comprise of approximately four percent of nurses in the United States. The two male nurse practitioners in this study equaled 3.3 % of the sampled 60 nurse practitioners.

Education programs and practice regulations (licensure, prescriptive privileges) for nurse practitioners vary considerably from state to state. The results reported in this study are descriptive of judgment processes and demonstrate that there is considerable variation among nurse practitioners.

The final limitation was that nurse practitioners received the minimal manipulation in this study. Future studies may need to include the option of giving multiple choices that more closely mimic the decisions that nurse practitioners make in real practice. For example, a study by Reyna and Lloyd (2006) looked at how physician and student physicians made decisions regarding the deviation from the guidelines concerning the treatment of cardiac risk. The authors gave each judge the choice to treat a patient presenting to the emergency department (ED) with chest pain by sending them to a medical-surgical unit without telemetry, admission to a telemetry unit in the hospital, admission to a cardiovascular intensive care unit, sending them home with a follow-up appointment with their local physician, or other (specified by the participant). Future studies concerning how nurse practitioners make decisions regarding cardiac risk could display such choices for detection and treatment.

Foundations for Future Research

In this study, the analysis was conducted using an additive linear model to capture the judgments of nurse practitioners concerning CHD risk of patients. Other nonlinear or configural judgment models may be used in future studies. Medical prediction rules may include different scoring algorithms for male and female patients reflecting the inherent nonlinear ecological relationships among patient cues. In the context of judging patient risk for disease, it is unknown how intuitive such inter-cue relationships are to nurse practitioners despite dissemination of prediction rules in the professional literature. Future studies could explore the extent to which nurse practitioners perceive such inter-cue relationships and use configural and multiplicative judgment models when forming patient risk assessments. The Framingham worksheet could be of continued use to evaluate how the worksheet presented under different conditions may change nurse practitioners accuracy in CHD risk assessment. Furthermore, other risk factors such as family history may be added as a cue to mimic the more realistic information that nurse practitioners are exposed to when meeting with a patient and collecting risk factor information. Also, the inclusion of insurance status could be an important factor when the clinician is making a decision to refer or not refer to a specialist for follow-up.

Implications for Nurse Practitioners and Educators

The Social Judgment approach to planning and evaluating nurse educational interventions allows an objective evaluation of how professional clinicians make complex decisions on a daily basis. Contemporary educational strategies are learner centered and target interventions as means of changing knowledge and practice. These results suggest that it is possible to construct and study the information used by nurse practitioners and evaluate the complex judgment and decision-making techniques associated with practice for future development of appropriate educational opportunities. The lack of agreement with the Framingham risk equation concerning the cue, gender, indicate a need for education about the gender differences in CHD risk factors to increase awareness. This has implications for the development of educational opportunities and continuing education modules. Also, this study indicates how well evidence-based practice increases nurse practitioners knowledge of CHD risk factors in a primary care population. As healthcare becomes more complex and nurse practitioners are given increasing responsibility for assessment, prevention, and treatment of CHD more evidence-based practice needs to be implemented. Nurse practitioners like many clinicians need to be able to cite why they made the decision to treat, not treat, or refer for follow-up. These types of evidence based decision-making techniques will improve patient outcomes as well as decrease a nurse practitioners risk for liability.

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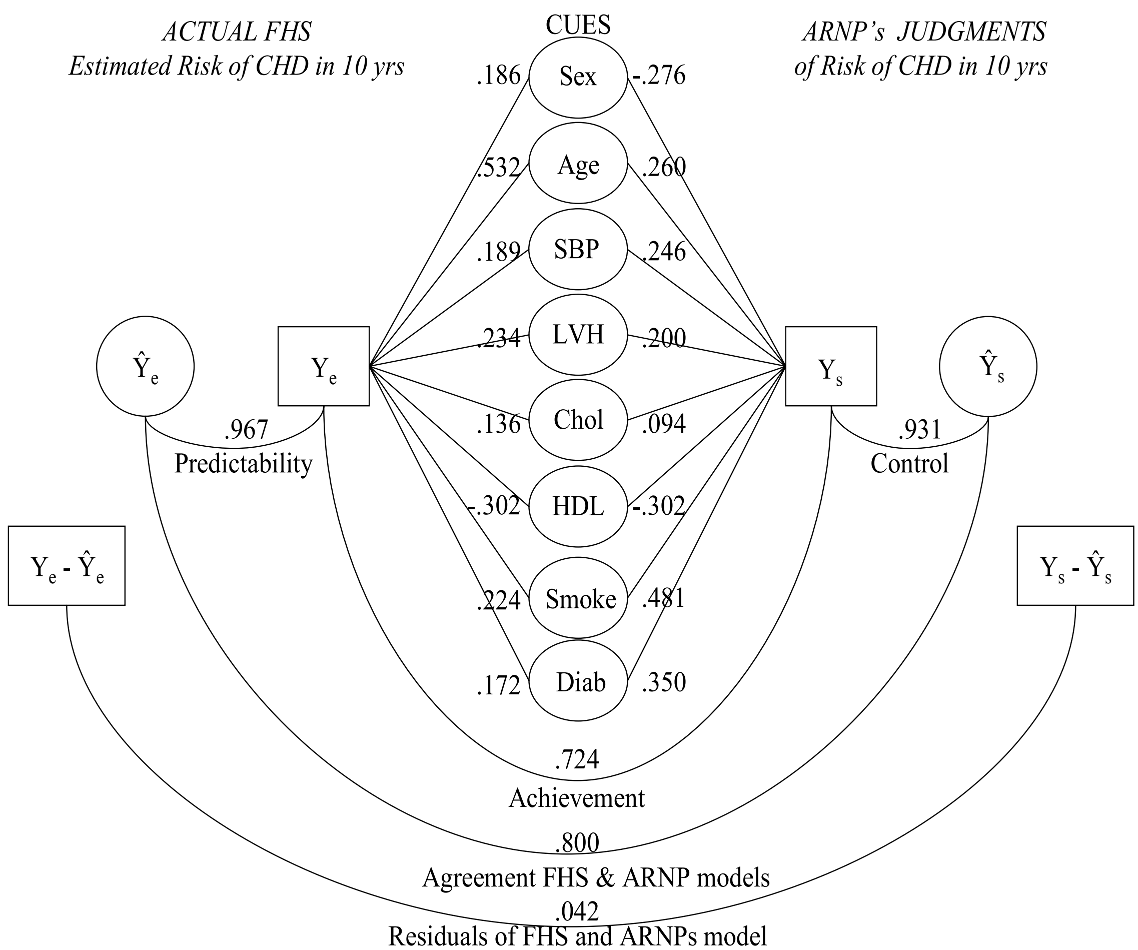
Appendix A: Brunswik Lens Model

Lens Model with CHD Cues (Cooksey, 1996)



Appendix B: Experimental Manipulations

Condition 1: Comparative Feedback Example:

How important was each cue as you formed your estimates of CHD risk?

Divide 100 points among the cues below. Assign the most points to the cue(s) you relied on the most.

_____ Gender
_____ Age
_____ Systolic Blood Pressure
_____ Left Ventricular Hypertrophy
_____ Total Cholesterol Level
_____ High Density Lipoprotein Level
_____ Smoker
_____ Diabetes

_____ TOTAL

Actual importance of each cue

8.6 Gender
22.2 Age
10.4 Systolic Blood Pressure
20.1 Left Ventricular Hypertrophy
6.1 Total Cholesterol Level
11.4 High Density Lipoprotein Level
9.5 Smoker
11.6 Diabetes

100 TOTAL

Condition 2: Framingham Heart Study CHD Risk Prediction Worksheet

TABLE 5. Framingham Heart Study Coronary Heart Disease Risk Prediction Chart

1. Find points for each risk factor

Age (if female) (yr)				Age (if male) (yr)				HDL cholesterol			
Age	Points	Age	Points	Age	Points	Age	Points	HDL	Points	HDL	Points
30	−12	41	1	30	−2	48–49	9	25–26	7	67–73	−4
31	−11	42–43	2	31	−1	50–51	10	27–29	6	74–80	−5
32	−9	44	3	32–33	0	52–54	11	30–32	5	81–87	−6
33	−8	45–46	4	34	1	55–56	12	33–35	4	88–96	−7
34	−6	47–48	5	35–36	2	57–59	13	36–38	3		
35	−5	49–50	6	37–38	3	60–61	14	39–42	2		
36	−4	51–52	7	39	4	62–64	15	43–46	1		
37	−3	53–55	8	40–41	5	65–67	16	47–50	0		
38	−2	56–60	9	42–43	6	68–70	17	51–55	−1		
39	−1	61–67	10	44–45	7	71–73	18	56–60	−2		
40	0	68–74	11	46–47	8	74	19	61–66	−3		

Total cholesterol (mg/dl)				Systolic blood pressure (mm Hg)					Points	
Chol	Points	Chol	Points	SBP	Points	SBP	Points	Other factors	Yes	No
139–151	−3	220–239	2	98–104	−2	150–160	4	Cigarette smoking	4	0
152–166	−2	240–262	3	105–112	−1	161–172	5	Diabetes		
167–182	−1	263–288	4	113–120	0	173–185	6	Male	3	0
183–199	0	289–315	5	121–129	1			Female	6	0
200–219	1	316–330	6	130–139	2			ECG-LVH	9	0
				140–149	3					

2. Add points for all risk factors

____ (Age) + ____ (Total chol) + ____ (HDL) + ____ (SBP) + ____ (Smoking) + ____ (Diabetes) + ____ (ECG-LVH) = ____ (Total)

Note: *Minus points subtract from total.*

3. Look up risk corresponding to point total

	Probability (%)			Probability (%)			Probability (%)			Probability (%)	
Points	5 yr	10 yr	Points	5 yr	10 yr	Points	5 yr	10 yr	Points	5 yr	10 yr
≤1	<1	<2	9	2	5	17	6	13	25	14	27
2	1	2	10	2	6	18	7	14	26	16	29
3	1	2	11	3	6	19	8	16	27	17	31
4	1	2	12	3	7	20	8	18	28	19	33
5	1	3	13	3	8	21	9	19	29	20	36
6	1	3	14	4	9	22	11	21	30	22	38
7	1	4	15	5	10	23	12	23	31	24	40
8	2	4	16	5	12	24	13	25	32	25	42

4. Compare with average 10-year risk

Age (yr)	Probability (%)		Age (yr)	Probability (%)		Age (yr)	Probability (%)	
	Women	Men		Women	Men		Women	Men
30–34	<1	3	45–49	5	10	60–64	13	21
35–39	<1	5	50–54	8	14	65–69	9	30
40–44	2	6	55–59	12	16	70–74	12	24

HDL, high density lipoprotein; SBP, systolic blood pressure; ECG-LVH, left ventricular hypertrophy by electrocardiography.

Appendix C: Patient Profiles

Patient Number: 1

Gender: FEMALE

Age: 57

Systolic Blood Pressure: 144

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 179

High Density Lipoprotein Level: 64

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.
Estimated Risk is ______%
Would you refer this patient to a cardiologist?
_Yes _No

Patient Number: 2

Gender: MALE

Age: 33

Systolic Blood Pressure: 124

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 169

High Density Lipoprotein Level: 34

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?
_Yes _No

Patient Number: 3

Gender: FEMALE

Age: 63

Systolic Blood Pressure: 170

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 233

High Density Lipoprotein Level: 69

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 4

Gender: FEMALE

Age: 53

Systolic Blood Pressure: 149

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 219

High Density Lipoprotein Level: 56

Smoker: NO

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 5

Gender: MALE

Age: 67

Systolic Blood Pressure: 176

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 230

High Density Lipoprotein Level: 34

Smoker: NO

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 6

Gender: MALE

Age: 55

Systolic Blood Pressure: 129

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 225

High Density Lipoprotein Level: 42

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 7

Gender: FEMALE

Age: 65

Systolic Blood Pressure: 135

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 291

High Density Lipoprotein Level: 46

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 8

Gender: FEMALE

Age: 57

Systolic Blood Pressure: 137

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 247

High Density Lipoprotein Level: 57

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 9

Gender: MALE

Age: 44

Systolic Blood Pressure: 107

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 176

High Density Lipoprotein Level: 34

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 10

Gender: FEMALE

Age: 71

Systolic Blood Pressure: 165

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 317

High Density Lipoprotein Level: 50

Smoker: NO

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 11

Gender: MALE

Age: 72

Systolic Blood Pressure: 128

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 218

High Density Lipoprotein Level: 35

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 12

Gender: FEMALE

Age: 72

Systolic Blood Pressure: 140

Left Ventricular Hypertrophy: YES

Total Cholesterol Level: 226

High Density Lipoprotein Level: 45

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 13

Gender: FEMALE

Age: 55

Systolic Blood Pressure: 100

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 256

High Density Lipoprotein Level: 41

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 14

Gender: FEMALE

Age: 56

Systolic Blood Pressure: 119

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 262

High Density Lipoprotein Level: 46

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 15

Gender: MALE

Age: 65

Systolic Blood Pressure: 173

Left Ventricular Hypertrophy: YES

Total Cholesterol Level: 191

High Density Lipoprotein Level: 29

Smoker: NO

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 16

Gender: FEMALE

Age: 52

Systolic Blood Pressure: 130

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 182

High Density Lipoprotein Level: 50

Smoker: YES

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 17

Gender: MALE

Age: 35

Systolic Blood Pressure: 144

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 187

High Density Lipoprotein Level: 53

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 18

Gender: FEMALE

Age: 65

Systolic Blood Pressure: 151

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 257

High Density Lipoprotein Level: 61

Smoker: NO

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 19

Gender: MALE

Age: 55

Systolic Blood Pressure: 132

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 221

High Density Lipoprotein Level: 36

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 20

Gender: MALE

Age: 65

Systolic Blood Pressure: 153

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 230

High Density Lipoprotein Level: 47

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 21

Gender: MALE

Age: 34

Systolic Blood Pressure: 118

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 224

High Density Lipoprotein Level: 35

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 22

Gender: FEMALE

Age: 55

Systolic Blood Pressure: 163

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 243

High Density Lipoprotein Level: 44

Smoker: YES

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 23

Gender: FEMALE

Age: 65

Systolic Blood Pressure: 117

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 268

High Density Lipoprotein Level: 44

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 24

Gender: FEMALE

Age: 54

Systolic Blood Pressure: 120

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 278

High Density Lipoprotein Level: 70

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 25

Gender: FEMALE

Age: 53

Systolic Blood Pressure: 137

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 311

High Density Lipoprotein Level: 66

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 26

Gender: MALE

Age: 54

Systolic Blood Pressure: 136

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 175

High Density Lipoprotein Level: 39

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 27

Gender: FEMALE

Age: 57

Systolic Blood Pressure: 128

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 175

High Density Lipoprotein Level: 56

Smoker: YES

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 28

Gender: FEMALE

Age: 44

Systolic Blood Pressure: 110

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 188

High Density Lipoprotein Level: 49

Smoker: YES

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 29

Gender: MALE

Age: 33

Systolic Blood Pressure: 126

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 236

High Density Lipoprotein Level: 60

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 30

Gender: FEMALE

Age: 54

Systolic Blood Pressure: 132

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 279

High Density Lipoprotein Level: 54

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 31

Gender: MALE

Age: 38

Systolic Blood Pressure: 113

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 162

High Density Lipoprotein Level: 50

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 32

Gender: MALE

Age: 46

Systolic Blood Pressure: 130

Left Ventricular Hypertrophy: YES

Total Cholesterol Level: 173

High Density Lipoprotein Level: 37

Smoker: YES

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 33

Gender: MALE

Age: 55

Systolic Blood Pressure: 116

Left Ventricular Hypertrophy: YES

Total Cholesterol Level: 249

High Density Lipoprotein Level: 31

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 34

Gender: FEMALE

Age: 34

Systolic Blood Pressure: 112

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 159

High Density Lipoprotein Level: 66

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 35

Gender: FEMALE

Age: 43

Systolic Blood Pressure: 146

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 191

High Density Lipoprotein Level: 52

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 36

Gender: MALE

Age: 55

Systolic Blood Pressure: 112

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 213

High Density Lipoprotein Level: 49

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 37

Gender: MALE

Age: 47

Systolic Blood Pressure: 122

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 220

High Density Lipoprotein Level: 50

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 38

Gender: FEMALE

Age: 64

Systolic Blood Pressure: 150

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 227

High Density Lipoprotein Level: 50

Smoker: YES

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 39

Gender: MALE

Age: 65

Systolic Blood Pressure: 127

Left Ventricular Hypertrophy: YES

Total Cholesterol Level: 197

High Density Lipoprotein Level: 37

Smoker: YES

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 40

Gender: FEMALE

Age: 55

Systolic Blood Pressure: 159

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 196

High Density Lipoprotein Level: 64

Smoker: NO

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 41

Gender: MALE

Age: 54

Systolic Blood Pressure: 115

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 179

High Density Lipoprotein Level: 46

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 42

Gender: MALE

Age: 44

Systolic Blood Pressure: 121

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 218

High Density Lipoprotein Level: 34

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 43

Gender: FEMALE

Age: 46

Systolic Blood Pressure: 121

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 201

High Density Lipoprotein Level: 69

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 44

Gender: FEMALE

Age: 42

Systolic Blood Pressure: 111

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 219

High Density Lipoprotein Level: 70

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 45

Gender: MALE

Age: 35

Systolic Blood Pressure: 114

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 240

High Density Lipoprotein Level: 45

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 46

Gender: MALE

Age: 67

Systolic Blood Pressure: 149

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 201

High Density Lipoprotein Level: 60

Smoker: NO

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 47

Gender: MALE

Age: 53

Systolic Blood Pressure: 135

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 205

High Density Lipoprotein Level: 33

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 48

Gender: FEMALE

Age: 53

Systolic Blood Pressure: 157

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 257

High Density Lipoprotein Level: 28

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 49

Gender: MALE

Age: 72

Systolic Blood Pressure: 102

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 198

High Density Lipoprotein Level: 38

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 50

Gender: MALE

Age: 35

Systolic Blood Pressure: 133

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 221

High Density Lipoprotein Level: 43

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 51

Gender: MALE

Age: 72

Systolic Blood Pressure: 144

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 183

High Density Lipoprotein Level: 39

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 52

Gender: MALE

Age: 50

Systolic Blood Pressure: 122

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 199

High Density Lipoprotein Level: 40

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 53

Gender: MALE

Age: 66

Systolic Blood Pressure: 178

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 215

High Density Lipoprotein Level: 47

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 54

Gender: FEMALE

Age: 45

Systolic Blood Pressure: 106

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 195

High Density Lipoprotein Level: 64

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 55

Gender: FEMALE

Age: 64

Systolic Blood Pressure: 131

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 241

High Density Lipoprotein Level: 40

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 56

Gender: MALE

Age: 45

Systolic Blood Pressure: 123

Left Ventricular Hypertrophy: YES

Total Cholesterol Level: 215

High Density Lipoprotein Level: 41

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 57

Gender: MALE

Age: 32

Systolic Blood Pressure: 131

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 204

High Density Lipoprotein Level: 37

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 58

Gender: FEMALE

Age: 34

Systolic Blood Pressure: 109

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 145

High Density Lipoprotein Level: 58

Smoker: YES

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 59

Gender: FEMALE

Age: 34

Systolic Blood Pressure: 98

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 201

High Density Lipoprotein Level: 52

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 60

Gender: FEMALE

Age: 46

Systolic Blood Pressure: 126

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 195

High Density Lipoprotein Level: 54

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 61

Gender: MALE

Age: 64

Systolic Blood Pressure: 156

Left Ventricular Hypertrophy: YES

Total Cholesterol Level: 176

High Density Lipoprotein Level: 46

Smoker: NO

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 62

Gender: MALE

Age: 42

Systolic Blood Pressure: 160

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 176

High Density Lipoprotein Level: 35

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 63

Gender: MALE

Age: 44

Systolic Blood Pressure: 126

Left Ventricular Hypertrophy: YES

Total Cholesterol Level: 174

High Density Lipoprotein Level: 34

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 64

Gender: MALE

Age: 55

Systolic Blood Pressure: 133

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 246

High Density Lipoprotein Level: 32

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 65

Gender: FEMALE

Age: 45

Systolic Blood Pressure: 159

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 183

High Density Lipoprotein Level: 58

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 66

Gender: FEMALE

Age: 56

Systolic Blood Pressure: 116

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 242

High Density Lipoprotein Level: 64

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 67

Gender: MALE

Age: 50

Systolic Blood Pressure: 111

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 181

High Density Lipoprotein Level: 36

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 68

Gender: FEMALE

Age: 66

Systolic Blood Pressure: 137

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 178

High Density Lipoprotein Level: 58

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 69

Gender: MALE

Age: 46

Systolic Blood Pressure: 144

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 229

High Density Lipoprotein Level: 30

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 70

Gender: MALE

Age: 53

Systolic Blood Pressure: 128

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 185

High Density Lipoprotein Level: 58

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 71

Gender: FEMALE

Age: 57

Systolic Blood Pressure: 144

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 179

High Density Lipoprotein Level: 64

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 72

Gender: MALE

Age: 33

Systolic Blood Pressure: 124

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 169

High Density Lipoprotein Level: 34

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 73

Gender: FEMALE

Age: 63

Systolic Blood Pressure: 170

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 233

High Density Lipoprotein Level: 69

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 74

Gender: FEMALE

Age: 53

Systolic Blood Pressure: 149

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 219

High Density Lipoprotein Level: 56

Smoker: NO

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 75

Gender: MALE

Age: 67

Systolic Blood Pressure: 176

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 230

High Density Lipoprotein Level: 34

Smoker: NO

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 76

Gender: MALE

Age: 55

Systolic Blood Pressure: 129

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 225

High Density Lipoprotein Level: 42

Smoker: YES

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 77

Gender: FEMALE

Age: 65

Systolic Blood Pressure: 135

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 291

High Density Lipoprotein Level: 46

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 78

Gender: FEMALE

Age: 57

Systolic Blood Pressure: 137

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 247

High Density Lipoprotein Level: 57

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 79

Gender: MALE

Age: 44

Systolic Blood Pressure: 107

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 176

High Density Lipoprotein Level: 34

Smoker: NO

Diabetes: NO

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

Patient Number: 80

Gender: FEMALE

Age: 71

Systolic Blood Pressure: 165

Left Ventricular Hypertrophy: NO

Total Cholesterol Level: 317

High Density Lipoprotein Level: 50

Smoker: NO

Diabetes: YES

On a scale from 0% to 100%, Estimate this patient's risk for CHD within the next 10 years.

Estimated Risk is ______%

Would you refer this patient to a cardiologist?

_Yes _No

About the Author

Kelly D. Stamp received a Bachelor of Science in Nursing Degree from Southeast Missouri State University, Cape Girardeau, Missouri in 1998 and a Master of Nursing Degree from the University of South Florida, Tampa, Florida in 2004. She was a staff nurse in a cardiac surgical unit and medical intensive care unit from 1998 to 2002 before returning to the University of South Florida to complete her Master and Doctoral degrees.

Ms. Stamp has remained active in critical care nursing and is currently an Instructor at the University of South Florida. After the completion of her Doctoral education, Ms. Stamp remained in academia and research.