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Heart disease risk and self-efficacy in overweight and obese adults

Christopher C. Imes, PhD, RN^{1,2}, Lorraine M. Novosel, PhD, CRNP, ANP-BC, GNP-BC¹, and Lora E. Burke, PhD, MPH, RN, SBM, FAHA, FAAN¹

¹School of Nursing, University of Pittsburgh, Pittsburgh, PA, United States

²Center for Bioethics and Law, University of Pittsburgh, Pittsburgh, PA, United States

Globally, cardiovascular disease (CVD) is the leading cause of death.¹ It is estimated that the number of annual deaths attributed to CVD worldwide will increase by 34% by 2030.¹ Nearly 86 million Americans have at least one form of CVD (e.g., hypertension, coronary heart disease [CHD]).² Annually, the cost of hospitalization associated with CHD in the United States exceeds \$10 million.³

There is strong epidemiologic evidence that CHD aggregates in families; individuals with one first-degree relative with premature CHD are up to four times more likely to have a cardiovascular event compared to those without a family history.^{4,5} Family histories reveal single-gene and complex genetic conditions and the shared environment that may increase disease risk.⁶ Therefore, family histories can provide essential information in clinical practice to identify individuals at increased risk for CVD and those who may have undiagnosed CVD.⁷

As of 2012, 69% of US adults, 73% of all males and 65% of all females, were overweight or obese based on their body mass index (BMI).⁸ Obesity is associated with excess mortality and is a major risk factor for diabetes mellitus, some cancers, sleep-disordered breathing, kidney disease and CVD.^{9,10} Findings from the Systematic Coronary Risk Evaluation (SCORE) dataset demonstrates an increase in systolic blood pressure and total cholesterol with a corresponding decrease in high-density lipoprotein cholesterol with each 1 unit increase in BMI.¹⁰ These findings are consistent for both male and females.¹⁰

Despite CVD being the leading cause of mortality, general knowledge about CVD and CVD risk factors is low among men and women.¹¹ According to Social Cognitive Theory (SCT), knowledge of health risk and benefits is essential to create the precondition for change in lifestyle.¹² Often, an individual's perceived CVD risk is lower than their actual risk, especially if the individual is at increased risk based on their risk factors.^{5,13} However, the impact of perceived risk on behavioral change is unclear. Several studies report a positive

Corresponding Author: Christopher C. Imes, School of Nursing, University of Pittsburgh, 336 Victoria Building, 3500 Victoria Street, Pittsburgh, PA 15261, United States, Phone number: 1-412-624-5872, imesc@pitt.edu.

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association between perceived risk and health-promoting behaviors; other studies report no association.^{14,15} Using family history and perceived risk as a tool to engage patients in health-promoting behaviors to lower CVD risk factors is key. For example, a recent meta-analysis examining primary prevention interventions for family members of coronary artery disease patients found that interventions were effective at decreasing CVD risk factors. The specific outcome measures in which statistically significant improvements were seen included: low-density lipoprotein cholesterol and diet (8 of the 10 studies) and physical activity/exercise (4 of the 7 studies).¹⁶ These data underscore the vital need for early identification of CHD risk factors and intervention.

Another key component of SCT is self-efficacy, the belief that an individual can control over his or her health behaviors, or more specifically that the person will initiate a behavior and sustain that behavior in the face of obstacles.¹² Without sufficient self-efficacy or belief in ones' capability, it is unlikely that the individual will engage in the behavior to change a risk factor.¹² Therefore, for behavior change to occur in an adult at increased risk for CHD, the individual must: 1) perceive that they are at high risk for CHD; 2) be aware of the benefits of CHD risk reducing lifestyle; and 3) have the self-efficacy to engage in a CHD risk reducing lifestyle. If any of these three conditions are missing, it is unlikely that behavior change will occur.

AIM AND DESIGN

The aim of this cross-sectional, descriptive study was to examine the associations between sociodemographic characteristics, CHD risk factors including family history, perceived CHD risk, and self-efficacy to eat a heart healthy low-fat, low-salt diet, in a sample of overweight and obese adults.

METHODS

Sample and Recruitment

For recruitment, we used a weight loss research registry comprised of individuals who expressed interest in or participated in weight-loss studies and agreed to be re-contacted for additional research studies. At the time of the study, the registry included 338 individuals with an active email address and was comprised mostly of females with a BMI >25kg/m². There were no additional inclusion or exclusion criteria for the study. Potential respondents received up to three email requests to complete the survey. Each email explained the purpose of the study and contained a link to the internet-based survey. By clicking on the survey, the respondent consented to the study. The University of Pittsburgh Human Subjects Review Board approved the study.

Measures

REDCap, a secure, web-based application hosted at the University of Pittsburgh, was used to collect and manage study data.¹⁷ REDCap's features include audit trails that track when data has been entered and altered; automated data export processes that support common statistical packages; and processes for importing external data.¹⁷

Sociodemographic and risk factors—Age, sex, marital status, years of education, employment status, health insurance status, and income were collected as part of the sociodemographic profile. Smoking status and medical history were collected to measure CHD risk factors.

Family history—Respondents were asked to complete an investigator developed CHD-focused family medical history questionnaire, which asked respondents if their first- and second-degree relatives had a history of CHD, stroke, hypertension, dyslipidemia, and diabetes. If the respondent indicated that a family member had one of the aforementioned conditions, a follow-up question was asked about the age of diagnosis to determine if the condition was premature. For this study, a family history of premature CHD was defined as a myocardial infarction, coronary artery bypass graft, or angioplasty in a first-degree relative before the age of 55 in a male relative or before the age of 65 in a female relative. A copy of the questionnaire is available upon request.

Perceived CHD risk—Respondents were asked their perceived overall lifetime CHD risk based on their age, sex, race/ethnicity, family history, and lifestyle on a visual analogue scale anchored by 0 (No Risk) and 100 (High Risk).

Self-efficacy—The 20-item Self-Efficacy and Eating Habits Survey (SEEHS) was used to assess self-efficacy to eat a low-fat, low-salt diet. It has 4 factors: sticking to it, reducing calories, reducing salt, and reducing fat. All responses ranged from 1 (I know I cannot) to 5 (I know I can). Cronbach's alpha for the 4 factors range from .85 to .93.¹⁸ For the SEEHS, it is recommended that only factor scores, not a total score, be used.¹⁸

Data Analysis

Data analyses were performed using SPSS 21.0 (IBM, 2012). Descriptive statistics were computed to describe the mean, standard deviation, median, and range. A total CHD risk factor score was calculated for each respondent. Respondents were assigned 1 point for each of following self-reported CHD risk factors: dyslipidemia, hypertension, family history of premature CHD, diabetes, and current smoking status. Race (White – no/yes), education (high school education or less/at least some college education or more), and income (< \$50,000 per year/ \$50,000 per year) were transformed into dichotomous variables. The Kruskal Wallis test was used to examine differences in perceived risk and self-efficacy by sociodemographic characteristics (except for age) and family history status. Linear regression was used to examine the associations between: 1) the number of CHD risk factors and perceived risk; 2) age and perceived risk; and 3) age and self-efficacy.

RESULTS

Surveys were sent to 338 eligible respondents. One-hundred-fifty-one (44.7%) surveys with complete data were used in the final analysis. Individuals who submitted incomplete surveys were more likely to be male, Black, and have diabetes compared to the individuals who submitted complete surveys (p-values<.05).

Respondents were predominantly female (91%) and White (81.5%) with a mean age 51.3 ± 10.4 years. The majority of respondents reported having at least some college education or more (83.4%) and household incomes greater than \$50,000 per year (65.6%). The prevalence of self-reported risk factors ranged from 32.5% for hypertension to 3.3% for currently smoking (Table 1).

Individuals who reported a family history of premature CHD had a higher perceived risk than individuals without a family history ($75.8 \pm 18.1.0$ vs. 63.3 ± 21.5 , $p < .01$). Furthermore, the total number of risk factors was positively associated with perceived lifetime risk ($\beta = 7.08$; $p < .001$) and increased incrementally with the number of reported risk factors (Table 1). Perceived risk in males respondents (77.6 ± 18.0) was higher than perceived risk in the females respondents (64.9 ± 21.5 , $p < .05$). Perceived risk did not differ by age, race, education, or income.

Mean SEEHS factor scores were: 3.61 ± 0.86 for “sticking to it,” 3.84 ± 0.75 for “reducing calories,” 3.99 ± 0.91 for “reducing salt,” and 4.27 ± 0.80 for “reducing fat” (Table 1). For all SEEHS factor scores, there were no differences between female and male respondents. However, non-whites reported a higher median “sticking to it” and “reducing calories” factor scores compared to Whites (4.00 vs. 3.60, $p = .01$ and 4.20 vs. 3.80, $p = .01$, respectively). Individuals with higher incomes ($> \$50,000/\text{year}$) and at least some college education had higher median “reducing fat” factors scores compared to those with lower incomes ($< \$50,000/\text{year}$) and no college education (4.60 vs. 4.20, $p = .00$ and 4.60 vs. 4.00, $p = .00$; respectively). Also, individuals who reported a family history of premature CHD had higher median “sticking to it” and “reducing calories” factors scores compared to those without a family history (4.00 vs. 3.40, $p = .00$ and 4.40 vs. 3.80, $p = .00$, respectively).

Age, number of CHD risk factors, and perceived risk were not significantly associated with SEEHS factor scores.

IMPLICATIONS

Consistent with the findings from other studies, we found that a self-reported family history of premature CHD and the number of CHD risk factors were positively associated with perceived risk.^{19,20} Within this sample, males reported a higher perceived risk compared to females. It is possible that males have a higher perceived risk threshold, meaning that they will only seek help when they perceive their risk to be significantly elevated. Therefore, their awareness of their CHD risk factors may have been the motivator that prompted them to enroll in the weight loss registry. However, this finding must be interpreted cautiously given the low number of male respondents.

For all respondents, self-efficacy for eating a low-fat, low-salt diet was relatively high. Specifically, we found that individuals with higher education levels and incomes had higher self-efficacy for “reducing fat.” For these individuals, their high level of education and their ability to buy healthier foods may have influenced their self-efficacy for reducing fat. Additionally, some of the respondents may have participated in a weight-loss intervention that included counseling on low-fat diets. For these individuals, their self-efficacy for

“reducing fat” may be a response to the skills they developed as part of the intervention. Also, non-white respondents reported higher self-efficacy for “sticking to it” and “reducing calories.” It has been suggested that non-whites have different weight-related attitudes and behaviors compared to whites and our findings may be a result of these different attitudes.²¹ For example, in a recent study, 44% of Blacks were “very confident” that they could eat less fat if they wanted to and only 11% were “not confident” that they could engage in that behavior.²²

Few studies have examined the relationship between a family history of premature CHD and self-efficacy. In our study, individuals with a family history of premature CHD reported higher self-efficacy for “sticking to it” and “reducing calories.” Dietary intake was not assessed as part of this study, so it is unknown if the individuals with higher diet-related self-efficacy followed diets that were healthier than the individuals who reported lower self-efficacy.

For the most part, sociodemographic factors and family history are non-modifiable and, therefore, not potential targets in a behavioral intervention. However, individuals with the characteristics or a profile that is associated with lower self-efficacy can be identified and provided with additional support and counseling to booster their self-efficacy. This additional step may need to be performed prior to initiating counseling on lifestyle changes.

One major challenge in the interpretation of these results is inconsistent findings regarding the association between self-efficacy measures and weight loss. Higher self-efficacy at baseline is not always associated with greater weight loss.²³ Often individuals are overconfident about their abilities to engage in major lifestyle changes such as reducing fat and calorie consumption when they are not being asked to perform this task. Only when individuals are engaging in these tasks do they realize how challenging reducing fat and calorie consumption is and that they lack the requisite skills to produce the desired effects.

This study has several limitations including its cross-sectional design. Respondents were mostly female, White, and well educated with incomes \$50,000. The generalizability of these findings is limited especially in terms of males, non-white, and lower incomes groups. Nonetheless, the findings confirm the strong association between an awareness of CHD risk factors, including a family history of premature CHD, and perceived CHD risk reported in other studies. Additional research is needed to determine what information and skill set enhancement techniques would most influence self-efficacy and the best strategies providers may use to enhance self-efficacy in individuals with limited knowledge or resources.

RECOMMENDATIONS

Nurse Practitioners (NPs) bring expert evidence-based knowledge to the patient-provider interaction. In today’s fast-paced clinical encounter, it is imperative for the NP to be able to quickly access, interpret, evaluate, and apply evidence-based guidelines into patient care. Evidence-based practice (EBP) and patient-centered care are two of the five core competencies recommended by the Institute of Medicine to ensure quality in patient care.²⁴

Yet, the increasing focus on EBP in the time-constrained encounter may inadvertently “compete” with efforts to deliver patient-centered care.

As NPs develop and prescribe treatment plans for their patients, they may become desensitized to the expectations they have of their patients to alter their behaviors according to “the evidence” and may not have (or take) time to reflect upon the extent to which their patients may/may not embrace the recommendations. Presuming that all patients will work to meet the NPs expectations and in turn, affect positive outcomes is shortsighted. NPs are confident in their ability to promote cardiovascular risk reduction,²⁵ yet patients and providers often have disparate goals and expectations. It is incumbent upon the NP to reconcile any differences by actively engaging the patient. Establishing a shared set of goals and expectations is necessary; however, it is not sufficient to change patient behavior.

SCT provides a foundation from which NPs can enhance their understanding of the many factors involved in patient behavior.¹² Specifically, it is crucial for NPs to understand the importance of perceived risk and self-efficacy in behavior change. SCT also provides a framework to guide NPs in developing strategies to effectively assist patients in health promotion and disease prevention behaviors.

SCT defines five elements that are central to effective health behaviors: (1) knowledge of health risks and benefits, (2) perceived self-efficacy, (3) outcome expectations, (4) personal goals with concrete plans and strategies, and (5) perceived facilitators and impediments to the changes being sought.¹² A discussion of strategies NPs may employ to optimize the “precondition” for behavior change in relation to primary and secondary CHD risk reduction follows.

Patient Knowledge of Health Risks and Benefits

Patient education is one of the cornerstones of NP practice. However, simply increasing patients’ knowledge does not lead to behavior change as knowledge in itself does not motivate most individuals to change their behaviors. Patients need to be educated about their personal CHD risk, contributing lifestyle factors, the risks and benefits of treatment options, and the likely health outcomes should they elect not to engage in recommended lifestyle changes. “Personalizing” CHD risk by providing patients with a quantitative assessment of their global CHD risk improves the accuracy of patients’ perceived CHD risk and can serve as a starting point for discussions about risk and risk reduction strategies.²⁶ Numerous “risk calculators” are available to help patients reduce any disparity between their perceived and calculated CHD risks and improve accuracy in risk perception (Table 2).

Perceived Self-efficacy

Self-efficacy is the belief that one has the power to effect desired changes through their own actions and shapes an individual’s outcome expectations.¹² Individuals with lower levels of self-efficacy (less than 7 on a scale of 0 to 10) anticipate less favorable outcomes while the opposite holds true for those who report higher self-efficacy. If patients *do not believe* they can produce the desired effect, they will lack motivation to push through with prescribed activities when difficulties or challenges arise. This study identified an association between three sociodemographic variables (race, income, and education) and self-efficacy. While

interpretation of the data cannot be generalized beyond this study sample, it is important for NPs to recognize that patient characteristics may promote or hinder self-efficacy. Asking patients questions such as a) *what is going on in your life that will help or hurt you in your effort?*, or b) *how confident are you that you can change ___ behavior and meet your goals?*, serve to strengthen the patient-provider partnership and can help patients persevere in their behavior change efforts.

Outcome Expectations

It is important to discuss the expected costs and benefits for various health habits as NPs work to increase the patient's chances for success when recommending a CHD risk reduction behavior(s). To promote effective behavior change, all expected costs (e.g., personal, financial, familial, workplace, etc.) should be discussed openly, since CHD risk reduction activities encompass all aspects of an individual's life and lifestyle. Patients should have a clear and realistic understanding of the outcomes that may be anticipated with various treatment strategies. Providing patients with a corresponding timeline for anticipated outcomes may help to circumvent personal disappointment when "overnight success" is not achieved.

Personal Goals

NPs need to be sensitive to the fact that treatment goals, based upon their expert evidence-based knowledge, may differ from those of their patients. Implication of evidence-based guideline recommendations must be tailored to each individual. It is important to take the time to discuss the patient's personal goals in relation to CHD risk reduction and to actively engage patients in developing the treatment plan. NPs need to work collaboratively with their patients to identify acceptable strategies to meet established goals. Goals should follow the SMART approach (specific, measureable, attainable, realistic, timely).²⁷ Interim results can provide positive feedback and reinforcement and motivation to continue with the new behavior activity and/or signal a need to meet with the patient to re-evaluate the overall treatment plan, recommended activities, and goals.

Perceived Facilitators and Impediments

Most individuals are keenly aware of their personal strengths and weaknesses and patients often share this information with their providers. An understanding of non-personal facilitators and impediments (e.g., family function and roles, employment, social role) may not be as readily apparent and may not even be identified until an individual begins his/her CHD risk reduction journey. Furthermore, unanticipated barriers can develop at any time and negatively impact the patient's self-efficacy and/or their ability to follow the prescribed treatment plan. Key to helping patients reduce, ameliorate, and/or circumvent impediments to effective behavior change is ongoing, clear, and supportive communication.

CONCLUSIONS

Changing behaviors to reduce CHD risk is challenging. NPs need to perform a detailed assessment, which includes assessing perceived risk, knowledge and understanding of CHD risk factors, and self-efficacy to engage in healthy habits, to better understand their patients'

ability to change behaviors. Sociodemographic characteristics may positively or negatively influence an individual's self-efficacy to engage in a low-fat, low-sodium diet. However, by identifying these factors at the outset of patient counseling and using these recommendations, the odds of actually achieving behavior change may increase.

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HIGHLIGHTS

- A reported family history of premature coronary heart disease (CHD) was associated with increased lifetime perceived CHD risk.
- Mean CHD perceived risk increased incrementally as the number of CHD risk factors increased.
- Individuals who are White, have lower income, or less education may require self-efficacy enhancement to achieve behavior change.
- The article includes resources for Nurse Practitioners to use in counseling patients with CHD.

Table 1

Respondent characteristics (N=151)

Characteristics	Mean $\pm$ SD or number and percentage of respondents	Range
Sociodemographics		
Age (years)	51.3 $\pm$ 10.4	23–73
Gender, female	137 (91%)	
Ethnicity, White	123 (81.5%)	
Education, years	16.2 $\pm$ 2.9	12–29
Combine household Income, \$50,000/year	99 (65.6%)	
Self-reported CHD risk factors		
One or more first-degree relatives with premature CHD	75 (49.6%)	
Hypertension	49 (32.5%)	
Hyperlipidemia	48 (31.8%)	
Diabetes	6 (3.9%)	
Current smoker	5 (3.3%)	
Measures		
Lifetime perceived CHD risk	66.1 $\pm$ 21.4	0–100
Perceived CHD risk by the number of risk factors (n)		
Zero (n=46)	56.5 $\pm$ 24.8	0–100
One (n=53)	65.1 $\pm$ 17.6	19–96
Two (n=30)	74.3 $\pm$ 18.4	25–100
Three (n=19)	77.0 $\pm$ 17.3	49–100
Four (n=3)	79.7 $\pm$ 20.5	55–100
Self-Efficacy and Eating Habits Survey		2.00–5.00
Sticking to it	3.61 $\pm$ 0.86	2.00–5.00
Reducing calories	3.84 $\pm$ 0.75	1.00–5.00
Reducing salt	3.99 $\pm$ 0.91	1.00–5.00
Reducing fat	4.27 $\pm$ 0.80	

SD, standard deviation; CHD, coronary heart disease

Table 2

Examples of risk calculation tools for nurse practitioners and patients

Tools for nurse practitioners	
<ul style="list-style-type: none"> • ACC/AHA atherosclerotic cardiovascular disease (ASCVD) risk estimator 	<ul style="list-style-type: none"> • Provides a 10-year and ASCVD lifetime risk based on the Pooled Cohort Equations • 10-year risk only provided in for patients 40–79 years of age • http://tools.acc.org/ASCVD-Risk-Estimator/
<ul style="list-style-type: none"> • Reynolds Risk Score 	<ul style="list-style-type: none"> • Provides a 10-year risk • Includes family history of premature heart attack and high-sensitivity C-reactive protein • http://www.reynoldsriskscore.org/
<ul style="list-style-type: none"> • Cardiovascular disease, 30-year risk Calculator 	<ul style="list-style-type: none"> • Provides 30-year risk based on Framingham Heart Study data • https://www.framinghamheartstudy.org/risk-functions/cardiovascular-disease/30-year-risk.php
Tools for patients	
<ul style="list-style-type: none"> • Heart age calculator 	<ul style="list-style-type: none"> • Overall “health” of your heart and how lifestyle related factors may affect your heart health • http://www.world-heart-federation.org/cardiovascular-health/heart-age-calculator/ • Calculated using Framingham Heart Study Data
<ul style="list-style-type: none"> • American Heart Association’s (AHA) My Life Check 	<ul style="list-style-type: none"> • Ideal Heart Score (0.0–10) based on the “Life’s Simple 7” • Higher scores are better • Includes “next steps” to improve the score and a summary report • Numerous educational resource available via AHA website