Outcomes of a Pilot Intervention Study for Young Adults at Risk for Cardiovascular Disease Based on Their Family History

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Background: Lifestyle choices have a significant impact on cardiovascular disease (CVD) risk. Interventions to promote a heart-healthy lifestyle in young adults at long-term high risk for CVD are needed to decrease the burden of CVD. However, few interventions with this purpose have been developed. Objective: The objective of this study was to examine the effect of a pilot intervention on young adults with a family history of CVD that used 3-generation pedigrees, risk factor information, and counseling on heart disease knowledge, perceived CVD risk, and intention to engage in a heart-healthy lifestyle. Methods: A pretest-posttest design, with within-group analysis, was used to examine the effect of the intervention. Paired t test and Wilcoxon signed rank tests were used to examine the changes in heart disease knowledge, perceived risk, and behavioral intention from baseline to postintervention. The Cohen d was calculated to examine the effect of the intervention on study measures. In addition, Spearman r was used to examine the associations between postintervention perceived risk, postintervention behavioral intention, and family history. Results: The sample for the pilot study included 15 mostly white and mostly female healthy young adults between the ages of 18 and 25 years. The intervention was effective at increasing CVD knowledge (P = .02) and had a medium effect on perceived risk and intention to engage in a heart-healthy lifestyle (Cohen d, 0.48–0.58). There were significant associations between postintervention perceived risk and postintervention intention to exercise and the participants’ family history of coronary heart disease (r = 0.62, P = .014 and r = 0.55, P = .035, respectively). Conclusions: Interventions are needed to increase individuals’ awareness of their long-term CVD risk and to improve their ability to make lifestyle changes. Although this intervention was only tested in a small sample, it shows promise to improve heart disease knowledge and perceived lifetime CVD risk and may effect longer-term risk for CVD.

KEY WORDS: cardiovascular diseases, family history, pilot study, primary prevention, risk assessment

Introduction

In the United States, cardiovascular disease (CVD) results in 1 death every 40 seconds. Despite the declining death rate from CVD and coronary heart disease (CHD) since the mid-1980s, CVD still accounts for 31.9% of all deaths and CHD, alone, causes 1 in every 6 deaths in the United States. The estimated total direct (health expenditures) and indirect (lost productivity from morbidity and premature mortality) costs of CVD and stroke in the United States in 2010 exceed $315 billion. It is safe to conclude that the burden of CVD remains high.

Risk for CVD is influenced by behavioral, environmental, and genetic components. Family history (FH), defined as the medical history of first- and second-degree relatives that may predispose the individual to specific diseases or medical conditions, reflects shared genes, environments, learned habits and behaviors, as well as the complex interactions between these factors. An FH of CVD is an independent, nonmodifiable risk factor for CVD, with premature CVD in first-degree relatives representing the greatest inherited risk. Several retrospective epidemiological studies have estimated the odds ratio for a lifetime cardiovascular event to be 2.6 to 4.1 for individuals with a first-degree relative who had a premature cardiovascular event.
Lifestyle choices have a significant impact on an individual’s lifetime CVD risk. Adherence to the Dietary Approaches to Stop Hypertension diet significantly reduces CVD, CHD, stroke, and heart failure risk. A systematic review and meta-analysis on observational prospective studies found that a Dietary Approaches to Stop Hypertension–like diet reduces CVD, CHD, and stroke risk by 20%, 21%, and 19%, respectively. The INTERHEART study, a large case-control study with nearly 30,000 subjects from 52 countries, found that the population’s attributable risk of physical inactivity for myocardial infarction is 12.2%. Multiple studies have shown that overweight and obesity increase an individual’s risk for CVD/CHD and mortality. For example, Wilson and colleagues reported that the relative risk for CVD increased by 20% among overweight males and females. In obese males, the relative risk for CVD increased to 46%, and in obese females, the relative risk increased to 64%. However, modest sustained lifestyle changes can significantly reduce CVD morbidity and mortality.

The American Heart Association has shifted its emphasis from the treatment of CVD to the prevention of risk factors to sustain a state of good health. This shift prompted the 2020 American Heart Association Goals with a new focus on prevention, control of risk, improved quality of life, and health promotion rather than the treatment of disease. Interventions aimed at health promotion in a currently healthy population, but at risk for CVD during their lifetime, are consistent with these goals. However, new approaches to communicate lifetime CHD/CVD risk in a population that is at low short-term (5–10 years) risk, but at high risk for developing CVD during their lifetime, are needed.

According to Valdez and colleagues, FH has the potential to become a screening instrument to identify people at increased risk for chronic diseases. Pedigrees documenting FH consolidate multiple pieces of health-related data, allowing invisible knowledge to become visible. In keeping with the American Heart Association’s 2020 emphasis on CVD prevention, we designed an innovative pilot study focused on FH and 3-generation pedigrees that highlighted CVD risk factors and emphasized health promotion in young adults. For this study, the 3-generation pedigrees included the proband and his or her siblings (the first generation); the proband’s parents, aunts, and uncles; (the second generation); and the proband’s grandparents (the third generation).

The purpose of this article is to report the outcomes of a brief behavioral intervention in young adults with an FH of CVD. Specifically, we examined whether the intervention would result in higher (1) heart disease knowledge, (2) perceived lifetime CVD risk, and (3) intention to engage in a health-promoting lifestyle to reduce long-term CVD risk. In addition, the associations between perceived lifetime CVD risk, intention to engage in a health-promoting lifestyle, and participants’ FH were examined.

**Methods**

**Design**

The study used a pretest-posttest design to test a 2-session behavioral intervention designed to increase heart disease knowledge, perceived lifetime CVD risk, and intention to engage in a heart-healthy lifestyle in 15 young adults. Measures were taken at baseline and after completion of the intervention, approximately 2 weeks later. The study was approved by the university’s institutional review board.

**Intervention**

The intervention was fully scripted and delivered to all the participants by the principal investigator. It consisted of 4 components delivered in 2 sessions: (1) the collection of FH information to create a 3-generation pedigree and a blood sample for lipid levels during session 1, (2) verification of FH information by discussing FH with relatives between sessions 1 and 2, (3) delivery of lifetime CVD risk information based on FH and CVD risk factors during session 2, and (4) brief behavioral counseling to promote cardiovascular risk reducing lifestyle during session 2.

The cardiovascular risk information delivered in session 2 was based on the following: (1) a detailed review of the 3-generation pedigree with an emphasis on the inheritance patterns of CVD and CVD risk factors within the participant’s family, (2) general risk information (low, moderate, high) based on first- and second-degree relatives; (3) odds ratios for lifetime CVD risk based only on first-degree relatives; (4) review of the participant’s low-density lipoprotein cholesterol and high-density lipoprotein cholesterol and comparing his or her results to the Adult Treatment Panel III recommendations; and (5) short-term risk based on the “Risk Assessment Tool for Estimating Your 10-year Risk of Having a Heart Attack”.

Each participant received brief counsel about increasing physical activity and eating a heart-healthy diet, guided by 3 American Heart Association pamphlets: Controlling Your Risk Factors, Just Move!, and Making Healthy Food and Lifestyle Choices. After each topic was reviewed, the participant repeated 2 or 3 tips or strategies that had been discussed to either improve their lifestyle or help maintain their current healthy practices.

Protect Motivation Theory provided the theoretical framework for the intervention. In Protect Motivation Theory, the cognitive process of coping appraisal, an individual’s perception of the effectiveness of action at preventing a negative outcome along with the individual’s perceived self-efficacy to perform that action, must
outweigh the threat appraisal, the individual's perceived vulnerability for a negative outcome, and the perceived severity of the outcome.\textsuperscript{19} Factors such as the cost (time, effort, money) of the action influences coping appraisal, whereas the aspects of the negative behavior that are enjoyed influences threat appraisal.\textsuperscript{19}

The intervention provided the participant with multiple messages targeting threat appraisal of CVD. Theoretically, by telling the interventionist about his or her family members with CVD, some of which may have died because of CVD, the participant's perceived vulnerability for CVD and the perceived severity of CVD increased. This message, increased personal vulnerability for CVD and increased severity of CVD, should be re-enforced when talking to family members with CVD and further re-enforced each time they are presented with information revealing their own personal risk for developing CVD.

Likewise, the intervention provided messages designed to increase coping appraisal. The behavioral counseling focused on evidence-based lifestyle changes shown to reduce CVD morbidity and mortality.\textsuperscript{11} Specifically, discussing the lifestyle changes aimed to increase the participants' knowledge of the response efficacy of a healthy lifestyle and their own perceived self-efficacy to make the needed lifestyle changes.

**Protocol**

**Recruitment**

A convenience sample of university students at 2 major universities in the Northwest was targeted for enrollment. At one of the universities, the sample was recruited through advertisements posted throughout the campus, a university-sponsored Web site that advertised research studies seeking healthy participants, and by word of mouth. At the second university, recruitment pamphlets were placed in the waiting room of the student health center.

The inclusion criteria were the following: ages 18 to 25 years; able to speak, read, and write English; and having at least 1 family member with CVD or CVD risk factors. Exclusion criteria were as follows: being pregnant, having a personal history of congenital heart defects; already being diagnosed with hypertension, dyslipidemia, or diabetes; or the inability to gather family medical history. All potential participants were screened over the phone by the principal investigator. Written informed consent was obtained during the first session before any data collection.

**Intervention Session 1**

The participant was instructed to fast for 12 hours before attending the first session. Blood pressure as well as height and weight were measured, and a blood sample was obtained for total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, and triglycerides levels. The blood sample was analyzed in a laboratory accredited by the College of American Pathologists and the Clinical Laboratory Improvement Amendments, where spectrophotometric analysis was used to obtain the laboratory values.

Next, an FH focusing on CVD risk factors and CVD was collected by interview. Family members included in the FH were siblings, parents, aunts and uncles, as well as grandparents. Information on FH was recorded using Progeny Clinical (Progeny Software, LLC, 2011). A draft pedigree was printed and given to the participant.

Next, he or she was instructed to verify the 3-generation pedigree with as many family members as possible between session 1 and session 2.

**Intervention Session 2**

In the beginning of this session, the pedigree was reviewed in detail and updated with any corrected or new medical health information. As part of the detailed review, the pattern of inheritance of CVD/CHD was highlighted and lifetime CVD risk information based on the participant’s FH was given. Next, the participant’s laboratory tests results were reviewed. This information, along with information obtained in session 1, was used to estimate the participant’s short-term CHD risk using the “Risk Assessment Tool for Estimating Your 10-Year Risk of Having a Heart Attack.”\textsuperscript{18} Then, the participant received counseling on increasing their physical activity and eating a healthy diet.

The feasibility and acceptability findings from the study have been previously published.\textsuperscript{20} To briefly summarize the findings, the investigators of this study, through their recruitment strategy, successfully enrolled eligible study participants, but the strategy needs to be modified to include additional sites in future trials. The intervention was monitored for dosage and fidelity; the intervention and study questionnaires were well received, and completion rates were 99% for study measures; and there was no attrition between session 1 and session 2.\textsuperscript{20}

**Study Measures**

The main study outcomes included the following: (1) change in heart disease knowledge, (2) change in perceived lifetime CVD risk, and (3) change in intention to engage in a health-promoting lifestyle. In addition, the relationships between postintervention perceived risk, postintervention intention to engage in a healthy lifestyle, and FH were examined.

Three measures were taken at baseline and after session 2 to assess the intervention. The Heart Disease Facts Questionnaire was used to assess heart disease knowledge and was modified for the study. The original Heart Disease Facts Questionnaire is a 25-item questionnaire developed to test knowledge of major risk factors for the development of CHD.\textsuperscript{21} The Heart Disease Facts Questionnaire is readable to an average 13-year-old individual.
and has adequate internal consistency, with a Kuder-Richardson 20 formula of 0.77. It included 10 items regarding the increased risk for developing CHD in individuals with diabetes. Because a current diagnosis of diabetes was part of the exclusion criteria, the questions related to diabetes were removed, resulting in a 15-item questionnaire.

To assess perceived lifetime CVD risk, an 11-point visual analog scale was used. A mark between numbers 0 and 4 was interpreted as low perceived risk. A mark on line number 5 was interpreted as uncertainty of risk. A mark between numbers 6 and 10 was interpreted as high perceived risk. In a recent study by Jones and colleagues, the scale had a 5-week test-retest reliability of 0.79.

Behavioral intention to exercise and eat a healthy diet during the next 6 weeks was assessed using a 6-item questionnaire with 3 questions for exercise and 3 questions for eating a healthy diet. It consisted of a modified version of an exercise intention questionnaire by de Bruijin and Rhodes and a healthy eating intention questionnaire by Armitage and Conner. Each question used a 7-point Likert scale. The mean score of the 3 questions for exercise and the 3 questions for eating a healthy diet was used as a composite score. A composite score less than 4 was interpreted as low intention to engage in the activity, and a score of greater than 4 was interpreted as high intention to engage in the activity. Both intention questionnaires have been used in a sample of young adults with a Cronbach α between 0.86 and 0.92. In this study, the Cronbach α for the 6-item questionnaire was slightly lower, but still acceptable, at 0.75.

### Statistical Analysis

Data analysis was conducted using SPSS 21.0 (IBM, 2012). A paired t test was used to determine the difference in baseline and postintervention Heart Disease Facts Questionnaire scores. The nonparametric Wilcoxon signed rank test was used to determine differences between baseline and postintervention scores on the visual analog scale for perceived lifetime CVD risk and the behavioral intention questionnaire. To adjust for multiple comparisons and prevent a type 1 error, we used the Bonferroni correction. For the analysis of the effect of the intervention on perceived lifetime CVD risk, an adjusted α level of 0.016 was used (adjusted for 3 comparisons). For the analysis of the impact of the intervention on intention to engage in a healthy lifestyle, an adjusted α level was 0.0125 (adjusted for 4 comparisons). The standardized mean difference, or Cohen d, was calculated to determine the effect of the intervention on the outcome measures; a Cohen d of 0.5 is interpreted as a medium effect and a Cohen d of 0.8 is interpreted as a large effect. The associations between postintervention perceived risk, postintervention intention to engage in a healthy lifestyle, and FH were examined using Spearman ρ.

## Results

### Participants

The sample (N = 15) of young adults was, on average, 20.8 (2.2) years old (mean [standard deviation], female n = 13, 86.7%), and white (n = 10, 66.7%; Table 1). On the basis of body mass index, 12 (80%) had a normal weight, 2 (13.3%) were underweight, and 1 (7.7%) was obese. Ten (66%) exercised 3 times a week or less. None of the participants reported smoking in the last 30 days. Besides FH, only 13.3% (2 of 15) of participants had an additional CVD risk factor. Both of these participants had low high-density lipoprotein cholesterol. Although 2 different universities were used to recruit participants, all participants came from a single university.

At baseline, heart disease knowledge was high (average percentage of correct answers was 93.7% [7.7%]) and perceived CVD risk was low (4.3 [1.8]; range, 2–7). Seven participants reported their perceived risk as low (score, <5); 4, as uncertain (score, 5); and 4, as high (score, >5). Generally, the participants intended to exercise (mean [SD] score, 4.9 [1.2]; range, 3–7) and eat a healthy diet (mean [SD] score, 5.7 [1.1]; range, 3–7) during the next 6 weeks.

### Study Outcomes

#### Heart Disease Knowledge

The change in percentage of correct answers on the Heart Disease Facts Questionnaire between baseline and after the intervention (Table 2) indicated that knowledge was increased significantly (P = .022; 95% confidence interval of the difference, 0.8%–9.01%). After the intervention, 7 participants (46.7%) had higher heart disease knowledge scores and the remaining 8 had no change in their score. Baseline scores indicated that the participants were quite knowledgeable about CVD and risk factors at the time of study entry. Nonetheless, the intervention

<table>
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<tr>
<th>TABLE 1 Baseline Characteristics of Study Participants (N = 15)</th>
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<td>Characteristics</td>
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<tr>
<td>Sociodemographics</td>
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<tr>
<td>Age, y</td>
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<tr>
<td>Gender, female</td>
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<td>Ethnicity, white</td>
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<tr>
<td>Anthropometry</td>
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<td>BMI, kg/m²</td>
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<td>HDL-C</td>
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BMI, body mass index; LDL-C, low-density lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol.
was effective at increasing heart disease knowledge in those with lower scores at baseline.

**Perceived Lifetime Cardiovascular Disease Risk**

After the intervention, most participants reported a higher lifetime risk for CVD compared with baseline (Z = 1.97, \( P = .048 \); Table 2), with a medium effect size (\( d = 0.56 \)). After the intervention, only 3 participants reported their perceived risk as low, 5 reported their risk to be uncertain, and 7 reported their perceived risk as high. When accounting for the adjustment for multiple comparisons, this finding was not statistically significant.

**Intention to Engage in a Health-Promoting Lifestyle**

After the intervention, the participants expressed a higher intention to engage in exercise (Z = 2.09; \( P = .036 \)) and to eat a healthy diet (Z = 1.85, \( P = .064 \); Table 2). The intervention had a medium effect on intention to exercise and intention to eat a healthy diet (\( d = 0.58 \) and \( d = 0.48 \), respectively). These results were not statistically significant after adjustment for multiple comparisons.

**Relationships Between Perceived Risk, Behavioral Intention, and Family History**

Postintervention perceived risk and postintervention intention to exercise were both positively correlated with the total number of first- and second-degree relatives, with CHD (\( r = 0.62 \), \( P = .014 \) and \( r = 0.55 \), \( P = .035 \), respectively; Figure). The correlation between postintervention intention to eat a healthy diet and the number of relatives with CHD was not significant.

**Discussion**

To our knowledge, this is the first intervention to evaluate FH using 3-generation pedigrees with currently healthy young adults at long-term high risk for CVD with the purpose of increasing perceived risk and intention to engage in a heart-healthy lifestyle.\(^{28}\) Overall, the intervention was associated with increased heart disease knowledge and had a medium effect on lifetime CVD risk and intention to engage in a heart-healthy lifestyle.

In our study, we found the participants’ heart disease knowledge to be relatively high at baseline. Contrary to our findings, Tamragouri and colleagues,\(^{28}\) in their study of 224 college freshmen, found heart disease knowledge to be low. Our sample was considerably smaller and consisted of both undergraduate and graduate students who self-selected themselves for the study on the basis of their understanding of CVD and CVD risk factors. These factors could help to explain the different findings between the 2 studies.

Few researchers have examined perceived lifetime CVD risk in young adults. Consistently, they have reported an increased perceived CVD risk for individuals who report an FH of CVD compared with individuals without an FH of CVD\(^ {29,30}\) as well as the positive correlation between perceived risk and the number of reported relatives with heart disease.\(^ {31}\) However, our findings were only significant when both first- and second-degree relatives with CVD were included. This is most likely caused by the ages of the first-degree relatives and the fact the CVD is relatively uncommon in young and middle-aged adults.\(^ {32}\) In our study, only 1 participant had a first-degree relative with diagnosed CHD, whereas 12 had second-degree relatives with diagnosed CHD.

In addition, we found that the number of first- and second-degree relatives with CHD was correlated with intention to exercise, but not with intention to eat a healthy diet. The association between an FH of CVD and behavior changes has been inconsistent, with some researchers reporting that an FH of CVD can improve screening practices and health-promoting behaviors,\(^ {33,34}\) whereas others report no or negative associations, such as a higher smoking rate among individuals with an FH of CVD.\(^ {35,36}\) However, all of these studies were observational. Interventions are needed to increase individuals’ ability to make lifestyle changes through the use of strategies such as eliciting family information using 3-generation pedigrees.

In this study, 2 participants reported a discrepancy between their actual risk and perceived risk during the postintervention assessment. One participant, who was obese, had multiple first- and second-degree relatives with hypertension. The participant’s blood pressure and

<table>
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<tr>
<th>Variable</th>
<th>Baseline</th>
<th>Postintervention</th>
<th>( P )</th>
<th>95% CI of the difference</th>
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<tbody>
<tr>
<td>Heart disease knowledge, mean (SD)</td>
<td>93.7 (7.8)</td>
<td>98.7 (3.7)</td>
<td>.022(^ a )</td>
<td>0.8–9.027</td>
</tr>
<tr>
<td>Perceived lifetime CVD risk, mean (SD)</td>
<td>4.3 (1.8)</td>
<td>5.3 (1.8)</td>
<td>.048</td>
<td>0.018–1.982</td>
</tr>
<tr>
<td>Based age, race/ethnicity, sex, lifestyle, and family history (0–10)</td>
<td>4.9 (1.2)</td>
<td>5.5 (1.3)</td>
<td>.036</td>
<td>0.358–1.283</td>
</tr>
<tr>
<td>Intention to eat a healthy diet, composite score</td>
<td>5.7 (1.1)</td>
<td>6.0 (1.1)</td>
<td>.064</td>
<td>–0.037 to 0.529</td>
</tr>
</tbody>
</table>

\( CI \), confidence interval; CVD, cardiovascular disease risk; HDFQ, Heart Disease Facts Questionnaire.

\( a \)Remained significant after adjusted for multiple comparisons.
lipid levels were within the recommended range. Hence, despite her FH and increased body weight, she perceived her lifetime CVD risk to be very low (1 of 10). The other participant expected her low-density lipoprotein cholesterol level to be elevated. It was revealed in her lipid panel that her low-density lipoprotein cholesterol met the current recommendations, but her high-density lipoprotein cholesterol was low. Given her FH and low high-density lipoprotein cholesterol level and her current healthy lifestyle and did not recognize the long-term risks.

Authors of multiple studies, including the Family Healthware Impact Trial and Dallas Heart Study, have found a significant discrepancy between perceived CVD risk and actual CVD risk. Various factors, including male gender, higher perceived health, younger age, and less knowledge of FH have been associated with incorrectly low perceived lifetime CVD risk. Efforts, such as this pilot intervention study, must be made to better deliver accurate risk information to individuals to lessen this discrepancy, which may lead to behavior change.

Given that almost half of all college students are physically inactive and those with low activity levels are at increased risk for metabolic syndrome and obesity, the need for interventions targeting this population is essential. Colleges and universities represent a unique setting where interventions using FH have a screening instrument to identify those at long-term high risk that could potentially benefit a large number of at-risk individuals. Counseling tailored to the resources available to the students (specific food choices at dining halls, exercise facilities, smoking cessation resources) can help to maximize the impact of these interventions.

For future considerations, the timing of the intervention may be essential. Kip and colleagues examined data from the longitudinal epidemiological Coronary Artery Risk Development in Young Adults study and found that there were no positive changes in CVD risk factors, including smoking status, weight, low-density lipoprotein cholesterol and high-density lipoprotein cholesterol levels, blood pressure, as well as physical activity,

**FIGURE.** A and B. Correlations between postintervention perceived risk, postintervention intention to exercise, and the number of relatives with coronary heart disease.
What’s New and Important

- Interventions are needed to promote or maintain a heart-healthy lifestyle in young adults who have a low short-term, but high long-term risk for CVD based on their FH.
- Collection of FH information and the presentation of lifetime CVD risk information based on FH by cardiovascular nurses can increase young adults’ perceived lifetime CVD risk and their intention to engage in a heart-healthy lifestyle.
- Additional research is needed to determine whether long-term perceived risk is increased after the intervention and whether actual behavior change occurs.

in young adults who had a first-degree relative experience a myocardial infarction or stroke during the previous 5 years. Their findings suggest that a cardiovascular event in a first-degree relative is not sufficient to promote long-term behavior changes. When such an event occurs, approaches that emphasize how the event influences the individual’s personal risk for future cardiovascular events may be needed to result in sustained behavior change.

**Limitations**

This study was limited by its design, sample homogeneity, and small size. The study was limited in the use of a single group. Because the study used a single-group design, there are multiple threats to validity that were not controlled, including history and test effects. Future research is needed, using a more rigorous experimental design to control these threats to internal validity. Moreover, the investigators of this study examined short-term perceived risk and intention to engage in a heart-healthy lifestyle, not actual changes. The study sample was limited to mostly white female participants who were enrolled in college, had a college degree, or were pursuing advanced degrees. Therefore, the generalizability of the study to other populations is limited. Most importantly, these findings are from a small pilot study. Although these findings are promising, the study was underpowered for examining outcomes and the results should be interpreted with caution.

**Conclusions**

The intervention was effective at increasing heart disease knowledge and had a medium effect on increasing perceived risk and intention to engage in a heart-healthy lifestyle. Given the effect size of the intervention on the study variables, a larger sample could have resulted in more statistically significant findings. Nonetheless, the intervention shows promise to improve heart disease knowledge as well as perceived lifetime CVD risk and may affect longer-term risk for CVD. Additional refinement and testing of the intervention with a larger, more diverse sample are warranted. Furthermore, the findings from this study should encourage clinicians to collect FHs and address long-term CVD risk in young adult patients who are at low short-term but high long-term risk for CVD.

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**REFERENCES**


