Heart Disease Knowledge, Awareness, and Perceived Risk in Oregon State University Students

by
Lindsay N. Hirsch

A THESIS

submitted to

Oregon State University

Honors College

in partial fulfillment of
the requirements for the
degree of

Honors Baccalaureate of Science in BioHealth Sciences
(Honors Associate)

Presented May 20, 2019
Commencement June 2019

AN ABSTRACT OF THE THESIS OF

Lindsay N. Hirsch for the degree of Honors Baccalaureate of Science in BioHealth Sciences presented on May 20, 2019. Title: Heart Disease Knowledge, Awareness, and Perceived Risk in Oregon State University Students

Abstract approved:_____

Viktor E. Bovbjerg

Cardiovascular disease (CVD) is the leading cause of death for both men and women in the U.S. but is often thought of as a man's disease. Women with CVD, however, suffer poorer health outcomes due to previous education of stereotypically "male" signs and symptoms of heart attacks, despite the fact that women experience additional symptoms uncommon to men. This study examined undergraduate students' awareness of CVD risk in America, knowledge of risk factors and signs and symptoms for both sexes, and perceived health risk of CVD. An online link to a survey was distributed to two lectures (n=50, 72% female, 28% male) of HHS 231 at Oregon State University (OSU). Analyses included correlation coefficients, independents samples t-tests, and ANOVA.

OSU students displayed low awareness of CVD risk in the U.S. (M: 3.2 out of 8), low perceived CVD health risk (M: 8.6 out of 40) and moderate to high knowledge of CVD risk factors (M: 14.6 out of 18) and MI signs and symptoms for both men and women (M: 7.3 out of 11). No statistical significance ($p<0.05$) was found in these variables between males and females.

Key Words: Heart disease, sex, awareness, knowledge, risk factors

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APPROVED:

_____

Viktor E. Bovbjerg, Mentor, representing Public Health and Human Sciences

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Kevin Ahern, Committee Member, representing Biochemistry and Biophysics

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Toni Doolen, Dean, Oregon State University Honors College

I understand that my project will become part of the permanent collection of Oregon State University, Honors College. My signature below authorizes release of my project to any reader upon request.

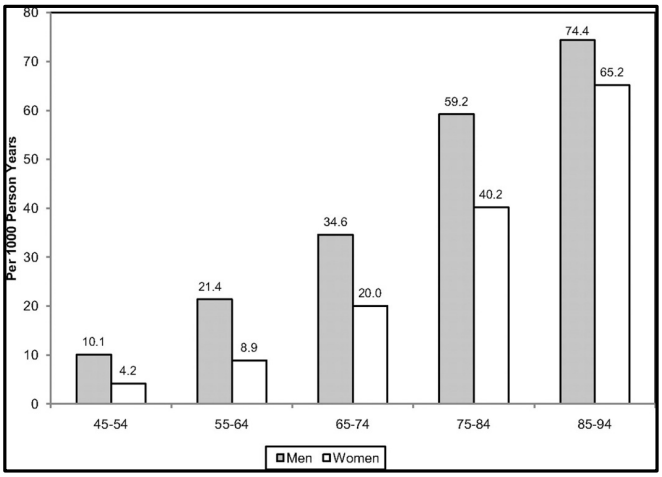
_____

Lindsay N. Hirsch, Author

Introduction:

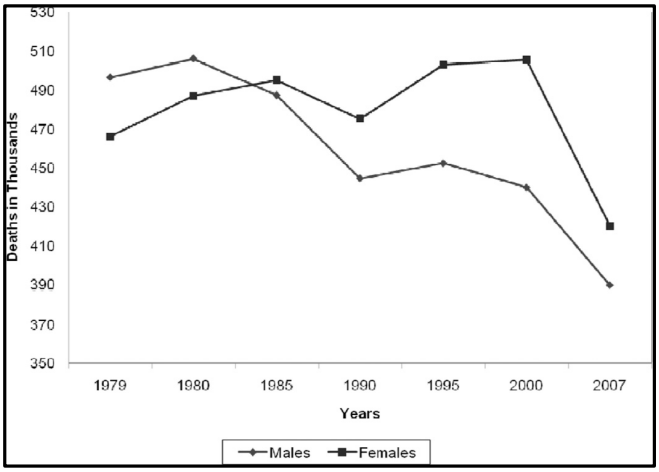
Heart disease is the leading cause of death for both men and women in the United States and thus poses a serious threat to the health of all American adults. Heart disease claims the lives of 630,000 individuals and costs approximately $200 billion annually for direct healthcare, medication, and resulting disabilities[1]. It is a common misconception that cardiovascular disease is a "man's disease," despite the fact it kills roughly equal numbers of men and women each year. According to the Centers for Disease Control and Prevention (CDC), only 54% of women are aware heart disease is the leading cause of death for women. In addition, women are more likely to believe they will die from breast cancer than from heart disease because it is more widely publicized and discussed among women[2].

Fig. 1: Annual Number of Deaths due to MIs or Fatal Coronary Heart Disease[3]



Men are more likely to suffer from heart attacks and cardiovascular disease (CVD) when compared to women (Figure 1)[3], and at younger ages. This being said, the number of men and women who die from CVD annually in the U.S. is roughly equal, with female deaths slightly outnumbering male deaths (Figure 2)[3]. Certain CVD risk factors, including smoking, Type 2 diabetes, and inadequate physical activity, have also demonstrated greater risk in women when compared to men[4].

Fig. 2: Trends in total annual number of deaths caused by CVD[3]



Stereotypically "male" signs and symptoms of myocardial infarctions (MI) have historically been presented to the public as indicators of a heart attack, regardless of the patient's gender. Women experience a wider variety of additional symptoms not common to men, such as nausea and pain in the back, neck, jaw, or stomach[5]. As a result, women experiencing MI are often misdiagnosed, leading to treatment delays and poorer health outcomes. In 2005, women displayed a higher risk of in-hospital deaths (5.6% vs. 4.3%), reinfarction (4.0% vs. 3.5%), heart failure (12.1% vs. 8.8%), stroke (1.1% vs. 0.8%), and red blood cell transfusion (17.2% vs. 13.2%)[6]. 53% of women's physicians do not consider their symptoms to be heart-related, compared to 36.7% of men[7]. Many women report that their physicians had failed to discuss coronary disease with them and misattributed their MI symptoms to anxiety, stress, and hypochondria[8]. Thus, sex is an important factor when considering how Americans perceive their risk of developing heart disease or suffering from a future MI (Figure 3) and may influence their likelihood of seeking out information regarding heart disease, learning about the signs and symptoms of an MI, and potentially taking steps to reduce their CVD risk.

Heart disease, like many other chronic conditions, is usually the result of years or decades of underlying pathogenic processes. Many risk factors for CVD, such as high blood pressure, high cholesterol, smoking, Type 2 diabetes, unhealthy diet, physical inactivity, and obesity, are modifiable. Thus, it is important to assess a low-risk group (in the case of this study, Oregon State University students) to uncover possible shortcomings in education or awareness efforts in order to improve preventative efforts before disease processes are underway. Early recognition of CVD risk factors and the signs and symptoms consistent with MIs is critical in preventing mortality and disability. Intervention at this low-risk stage in students' lives is the best approach if we are to reduce the incidence of heart disease in Americans.

The overarching goal of my project is to assess the current knowledge of CVD risk factors and symptoms of heart disease, awareness of CVD prevalence, and finally the perceived CVD health risk for both male and female students at Oregon State University (OSU) and related health behavior. After collecting survey data, I analyzed student knowledge, awareness, perceived health risk, and health behavior and then compared between sexes to determine the presence of any differences in these categories.

Study Aims:

I hypothesized the following for the three study aims, which helped shaped the completed survey distributed to OSU students:

1) **Are people in a CVD low-risk category knowledgeable and aware of the risk factors and signs and symptoms for both men and women associated with cardiovascular disease, as well as additional symptoms experienced by women during heart attacks?**

   Hypothesis: OSU students will display moderate knowledge of the signs, symptoms, and risks associated with heart disease. In addition, I predict knowledge and awareness of CVD risk factors and signs and symptoms will not differ by sex, due to lack of education and publicity efforts to inform the public of heart attack symptoms more common in women.

2) **What is the perceived CVD health risk of cardiovascular disease for people in a low-risk category, and does it vary by variables such as family history, current health status, age, knowledge, and/or awareness? Do predictors of perceived health risk vary by sex?**

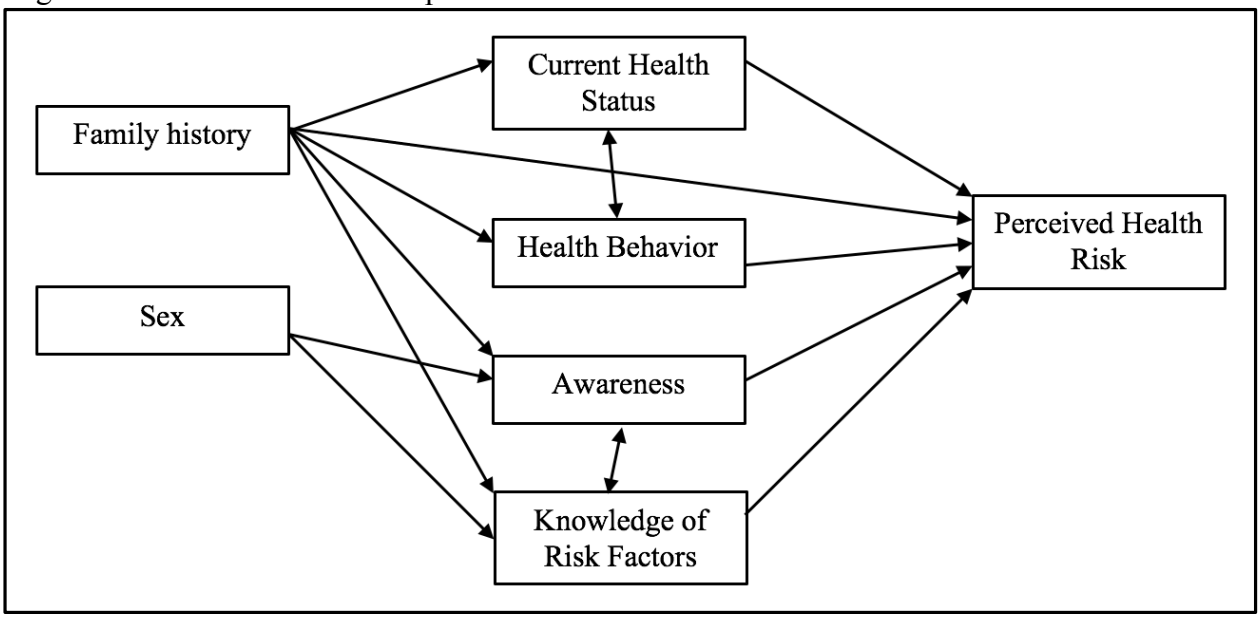
   Hypothesis: The perceived health risk of OSU students will be low because they are in a low-risk category for heart disease because of their young age. Individuals with significant CVD family histories, poor current health status, and poor health behavior will report greater perceived health risk. Perceived health risk across these domains will not differ significantly by sex.

3) **How is perceived CVD health risk associated with resulting health behavior for these individuals?**

Hypothesis: Students with high perceived CVD health risk will display positive health behaviors aimed at alleviating risk associated with heart disease, while individuals with moderate to low perceived CVD risk will likely engage in fewer positive health behaviors, such as regular exercise and healthy eating, and more negative health behaviors, such as little to no exercise, smoking, and poor diet.

Risk Perception:

Fig. 3: Heart Disease Risk Perception Flowchart



- Note: Age was not considered as a variable due to the narrow age range of participants (ages 18-26; 84% between ages 18-21)

Methods:

Seven domains were created to address the three study aims in order to best measure OSU student's knowledge and awareness of the prevalence of CVD in the U.S. and its associated risk factors and signs and symptoms for both men and women. I also assessed OSU student's perceived health risk of CVD by inquiring about family history, current health status, health behaviors, in addition to their knowledge and awareness of CVD in America. Seven domains potentially associated with perceived risk, and therefore potentially with risk reduction behavior, were assessed:

Domains:

1. Perceived Health Risk
2. Awareness
3. Knowledge of Risk Factors
4. Signs and Symptoms
5. Health Behavior
    a. BMI
    b. Physical Activity
    c. Diet
    d. Smoking
6. Family History
7. Current Health Status

1. Perceived risk:
   This domain included eight items inquiring about the likelihood one would suffer from a heart attack or stroke in the future or at some point in his or her life. Each item was measured on a scale from 0-5 in which a higher value designated a higher perceived risk. These values were summed to create a summary score for overall perceived health risk.

2. Awareness:
   This domain included eight items that assessed awareness of CVD in the U.S., differing CVD risks for men and women, and contrasting symptoms of heart attacks in men and women. Correct answers were assigned a value of 1 and totaled to create a summary score for overall awareness of CVD.

3. Health behavior:
   This domain was measured according to the four health behavior categories defined by the American Heart Association[9] as smoking, diet, physical activity, and body mass index (BMI). This domain included four sub-items assessing smoking behavior, five sub-items assessing individuals' physical activity over the past 30 days, two sub-items asking for height and weight to calculate a BMI, and nineteen sub-items inquiring about diet over the past thirty days. The average BMI of participants was reported and no participants reported current smoking behavior. Participants who met the physical activity guidelines outlined by the Surgeon General were assigned a score of 1 and these frequencies were reported for men, women, and overall participants. Lastly, diet items that indicated an unhealthy diet were assigned values on a scale of 0-5 according to how often participants ate these types of foods or beverages, with a higher value reflecting a higher frequency of unhealthy eating over the past 30 days. These values were summed to create a diet summary score.

4. Signs and symptoms:
   This domain included nine items assessing knowledge of the signs and symptoms of heart attacks observed in both men and women, as well as two items assessing the ability of participants to differentiate between the signs and symptoms consistent with

heart attacks versus strokes. Correct answers were assigned a value of 1 and totaled to create a signs and symptoms summary score.

5. Current health status:
   This domain included one item asking participants to rate their current overall health status ranging from very poor to excellent and one item asking about congenital heart conditions. Overall health answers were treated as categories upon analysis.

6. Family history:
   This domain included six items inquiring about family history of CVD risk factors such as high blood pressure, Type 2 diabetes, high cholesterol, and the age of male/female relative's first heart attack. Items that indicated family history of CVD were assigned a value of 1 and these values were totaled to create a family history summary score in which a higher value reflected a higher risk of CVD.

7. Knowledge of risk factors:
   This domain included eighteen items that assessed knowledge of CVD risk factors such as high blood pressure, obesity, diabetes, family history, and more. Correct answers were assigned a value of 1 and totaled to create a knowledge summary score in which a higher score reflected more knowledge of CVD risk factors.

These domains may contribute to a more developed understanding of a low-risk group of students' perceived risk of CVD through information about their current health, genetic or familial risk, and present health behaviors while also assessing knowledge and awareness of CVD. Statistical significance was determined by a p-value < 0.05.

Setting:

This survey was administered in cooperation with OSU's Corvallis campus course HHS 231 – Lifetime Fitness for Health. It was available to students registered for lectures taught by Dr. Erica Woekel during Winter term, 2019, Monday and Wednesday from 11:00-11:50 AM and Monday and Wednesday from 4:00-4:50 PM. The study design was cross-sectional, and the survey was available during Winter term, 2019.

Sample and Recruitment:

The intended population for the study was OSU students of all majors between the ages of 18-26. The OSU Course, HHS 231 – Lifetime Fitness for Health is required for all majors and thus provides an opportunity to survey a sufficient sample size with data generalizable to the greater OSU student population. I did not collect names or other personal identifiers. Participation was voluntary and anonymous. I attended one lecture in each class time and provided a brief 2-minute introduction and description of the survey with a 1-slide PowerPoint presentation. Instructions for accessing the link through Canvas and the relevance of the survey were outlined to recruit participants. Surveys were accessed online via a link posted on the course in Canvas, with no opportunity for others to observe or intercept survey information. Prior to the start of the survey was a statement informing participants of the duration and purpose of the study along with eligibility requirements, associated risks, and an item asking for consent. I

restricted participation to OSU students registered for HHS 231 who were over the age of 18 and fluent in English.

Survey Data Collection:

The survey was distributed to two lectures of HHS 231 – Lifetime Fitness for Health in the form of an online link available through Canvas once during Winter term, 2019. The principal investigator (PI) stored the anonymous data in a password protected folder in a restricted drive behind the OSU firewall and will retain this data for three years after the termination of the study.

Data entry:

Qualtrics is a web-based survey system available to OSU staff and students that collects survey responses online and stores it. Data entry consisted of exporting the Qualtrics data into Microsoft Excel and importing this dataset into SPSS statistical software.

Data cleaning:

Data was cleaned prior to data synthesis and data analysis in order to remove participants who were ineligible on the grounds that they were not over the age of 18, did not appear to have understood all the questions or be fluent in English, did not complete a majority of the survey, or appeared to have randomly completed the entire survey (ex. the same response was selected for multiple items or they appeared to have selected 1, 2, 3, 4, 5, rather than answering items accurately). Participants were removed only after discussion and reaching consensus between myself and Dr. Bovbjerg.

Furthermore, data was not immediately compatible when being transferred from Qualtrics into Excel and later into SPSS. This was evident when participants who otherwise appeared to have completed the survey had blank responses for items in which answer options included “I don’t know.” This was confirmed when reviewing the data file exported from Qualtrics into Excel which properly displayed “I don’t know” answers for items that included “Yes” or “No” as alternate answers but not for items that included “True” or “False” as alternate answers for these particular participants. This can likely be attributed to Qualtrics’ unique program in which True or False were seen as strictly dichotomous answer options. Thus, blank answers for participants who completed the entire survey and were confirmed to have selected “I don’t know” in the Excel spreadsheet were changed to “I don’t know” prior to data analysis in SPSS.

One participant reported themselves as a current smoker and then indicated they had never smoked in the following three smoking items. This error may be attributed to the fact participants cannot return to previous pages once proceeding past a page break. Thus, one participant was reclassified as a non-smoker.

Participants’ heights were reported in feet and inches and then converted to meters and rounded up to the nearest cm in order to calculate BMI.

Data synthesis:

Summary scores were constructed for continuous variables such as perceived health risk (PHR), family history (FH), awareness, knowledge, signs and symptoms, and diet.

Perceived health risk consisted of eight items ranging on a scale from 0-5 in which a higher value designated a higher perceived risk. Items that suggested a lower perceived health

risk were reverse coded, in which a lower value newly designated a higher perceived health risk. Values were then summed to create summary scores that ranged from a possible 0-40 "points" in which higher values reflected greater perceived risk.

Family history consisted of six items with the possible answer choices, "Yes," "No," and "I don't know," in which "Yes" was recoded to a value of 1 to indicate the presence of CVD family history and "No" was recoded to a value of 0 to indicate a lack of CVD family history. It was decided that "I don't know" did not indicate the presence of CVD family history and assigned it a value of 0. These values were then summed to create a family history summary score ranging from a possible 0-6 "points" in which a higher value reflected a more severe family history of CVD.

CVD awareness consisted of eight items in which possible answers included "True," "False," and "I don't know." Participants who reported "I don't know" for any of the items was considered just as unknowledgeable as a participant who confidently reported the incorrect answer and thus incorrect items and "I don't know" were designated a value of 0 while correct answers were assigned a value of 1. These values were summed to create an overall awareness summary score ranging from a possible 0-8 "points" in which a higher value demonstrated a greater awareness of CVD statistics in the U.S.

CVD knowledge consisted of eighteen items in which potential answers included "True," "False," and "I don't know." Similar to the awareness items, participants who reported "I don't know" for any of the items were considered to have answered incorrectly. Thus, "I don't know" and incorrect answers were assigned a value of 0 while correct answers were assigned a value of 1. These values were summed into overall knowledge scores ranging from a possible 0-18 "points" in which a higher value indicated a greater knowledge of CVD risk in America.

Signs and symptoms consisted of eleven items in which possible answers included "Yes," No," and "I don't know." Consistent with the knowledge and awareness items, "I don't know" answers were considered to be incorrect answers regarding the signs and symptoms of heart attacks and assigned a value of 0 while correct answers were recoded to a value of 1. These values were summed to create a summary score ranging from a possible 0-11 "points" in which a higher value reflected a greater knowledge of the signs and symptoms consistent with heart attacks in both men and women.

The diet screener items consisted of seventeen items in which participants were asked to recall how frequently they had eaten the following foods over the past thirty days. Possible answers included "More than once a day," "About once a day," "2-3 times a week," "About once a week," "1-3 times a month," and "Less than once a month or never." These values were recoded into a scale from 0-5 in which a higher value indicated more frequent eating of unhealthier foods. Items that reflected healthier diet decisions were reverse coded, in which a lower value newly designated poorer diet choices. In addition, one item inquired about the type of milk most frequently used over the past 30 days in which possible answers included "Whole milk," "2% fat," "1% fat," "1/2% fat," "Non-fat or skim," "Soy/almond/coconut/lactose free," "Canned milk," "Powdered milk," and "Did not use milk in the past 30 days." No participants selected "Canned milk," or "Powdered milk," and so "Did not use milk in the past 30 days," "Soy/almond/coconut/lactose free" values were recoded to a value of 0, "1/2%" and "1%" milk were recoded to a value of 1, "2% milk" was recoded to a value of 2, and "Whole milk" was recoded to a value of 3. Thus, a higher value similarly reflected poorer diet choices regarding milk product use. Lastly, one item inquired as to the type of oil most frequently used over the past 30 days with possible answer choices including "Pam/cooking spray," "Stick

margarine/butter/margarine blend/soft-tub," "Lard, fatback, bacon fat," "Crisco," "Vegetable oil/olive oil/corn oil," and "Vegan butter alternatives." Once again, the healthier oils, "Pam/cooking spray," "Vegetable oil/olive oil/corn oil," and "Vegan butter alternatives" were assigned a value of 0. All other cooking oil options were deemed unhealthier and assigned a value of 1. In total, these nineteen items were added together to create a summary score for diet ranging from a possible 0-89 "points" in which a higher value indicated poorer diet decisions over the past 30 days.

Lastly, participants' "sex assigned at birth" consisted of options "Male," "Female," and "Intersex" in which male participants were reassigned a value of 0, female participants were assigned a value of 1, and intersex participants were assigned a value of 2. Participants were then asked to report their gender identity. "Male" was assigned a value of 0, "Female" was assigned a value of 1, "Trans man" was assigned a value of 2, and "Other" was assigned a value of 3.

Race options included "Black or African American," "White," "Asian," "American Indian or Alaska Native," "Native Hawaiian or Other Pacific Islander (NHOPI)", and "Other." Participants were allowed to select all that applied and these were assigned a value of 1. Finally, the ethnicity item consisted of participants identifying themselves as Hispanic or Latino in which the answer "Yes" was reassigned a value of 1 and "No" was recoded to a value of 0.

Data analysis:

1) **Are people in a CVD low-risk category knowledgeable and aware of the risk factors and signs and symptoms for both men and women associated with cardiovascular disease, as well as additional symptoms experienced by women during heart attacks?**

   Summary scores for knowledge of CVD risk factors, knowledge of signs and symptoms for heart attacks in both men and women, and awareness of CVD in America were constructed. Descriptive statistics (mean and standard deviation) were calculated for all participants and stratified by sex.

2) What is the perceived CVD health risk of cardiovascular disease for people in a low-risk category, and does it vary by variables such as family history, current health status, age, knowledge, and/or awareness? Do predictors of perceived health risk vary by sex?

   Perceived CVD health risk items were totaled into an overall summary score that was compared to summary scores for family history, knowledge, awareness, current health status, and sex. The association of perceived CVD health risk to continuous measures was assessed using Pearson product-moment correlation coefficients, and to categorical variables by either independent samples t-tests or one-way analysis of variance. Due to the limited age range of participants, age was not considered as a factor in perceived health risk. Predictors of perceived CVD health risk were stratified by sex.

4) **How is perceived CVD health risk associated with resulting health behavior for these individuals?**

Perceived CVD health risk summary scores were compared to the summary scores for diet, BMI, physical activity, and smoking. As above, the association of perceived CVD health risk to continuous measures was assessed using Pearson product-moment correlation coefficients, and to categorical variables by either independent samples t-tests or one-way analysis of variance. As no participants reported themselves to be current smokers this item was not analyzed.

Results:

Table 1: Demographics
Frequencies of correct answers for all participants
***p-value < 0.05**

Variable	Male (Mean +/- s.d.)	Female (Mean +/- s.d.)	Total (Mean +/- s.d.)	p-value
Age	19.9 +/- 2.9	19.2 +/- 1.9	19.4 +/- 2.2	0.37
BMI	24.0 +/- 3.6	23.3 +/- 3.9	23.5 +/- 3.8	0.64
Perceived Health Risk Summary Score (range: 0-40)	8.2 +/- 4.0	8.4 +/- 5.8	8.6 +/- 5.6	0.92
Family Hx Summary Score (range: 0-6)	0.43 +/- 0.85	0.72 +/- 0.94	0.67 +/- 0.93	0.32
Knowledge of Risk Factors Summary Score (range: 0-18)	14.6 +/- 2.6	14.7 +/- 2.3	14.6 +/- 2.4	0.90
Awareness Summary Score (range: 0-8)	2.9 +/- 1.6	3.4 +/- 1.7	3.2 +/- 1.7	0.38
Signs & Symptom Summary Score (range: 0-11)	7.6 +/- 1.7	7.1 +/- 1.7	7.3 +/- 1.7	0.35
Diet Summary Score (range: 0-89)	30.8 +/- 7.9	28.3 +/- 7.9	29.0 +/- 7.9	0.33

Variable	Total (%)
Sex	
Male	28
Female	72

Gender	
Male	28
Female	68
Trans man	2
Other	2
Race	
Black	0
White	88
Asian	18
American Indian or Alaska Native	0
Native Hawaiian or Other Pacific Islander	2
Other	6
Ethnicity	
Hispanic/Latino	6
Non-Hispanic/Latino	94
Current Health Status	
Fair	15.7
Good	45.1
Very good	31.4
Excellent	7.8
Congenital Defect	3.9
Met PA Guidelines	70.6

Do you smoke now?	0
Perceived Health Risk Items	
Likely to suffer from HA/stroke in future	
Strongly disagree	21.6
Disagree	33.3
Neutral	33.3
Agree	11.8
Likely to have HA/stroke at some point in life	
Strongly Disagree	20
Disagree	26
Neutral	36
Agree	18
I feel I will suffer a HA/stroke sometime in my life	
Strongly Disagree	31.4
Disagree	25.5
Neutral	29.4
Agree	13.7
There is a good chance I will experience a HA/stroke w/i 10 yrs	
Strongly Disagree	64.7
Disagree	21.6
Neutral	13.7
Not worried I might have a HA/stroke	

Strongly Disagree	20
Disagree	28
Neutral	20
Agree	18
Strongly Agree	14
Chances of suffering a HA/stroke w/i 10 yrs are high	
Strongly Disagree	62.7
Disagree	25.5
Neutral	7.8
Agree	2
Strongly Agree	2
Likely I will have a HA/stroke b/c of my past/present behaviors	
Strongly Disagree	45.1
Disagree	39.2
Neutral	5.9
Agree	7.8
Strongly Agree	2.0
Concerned about likelihood of having a HA/stroke in the near future	
Strongly Disagree	47.1
Disagree	29.4
Neutral	15.7
Agree	2

Strongly Agree	5.9
Knowledge of Risk Factors Items	
A person always knows when they have CVD	
Correct	92.2
Family Hx increases risk of CVD	
Correct	98
Risk of CVD increases w/ age	
Correct	80.4
Smoking is a CVD risk factor	
Correct	90.2
Quitting smoking lowers CVD risk	
Correct	70.6
High BP is a CVD risk factor	
Correct	98
Keeping BP under control lowers CVD risk	
Correct	90.2
High cholesterol is a CVD risk factor	
Correct	94.1
High HDL is a CVD risk factor	
Correct	47.1
High LDL is a CVD risk factor	
Correct	82.4

Being overweight is a CVD risk factor	
Correct	92.2
Regular PA lowers CVD risk	
Correct	98
Walking/gardening are considered exercise that lowers CVD risk	
Correct	82.4
Diabetes is a CVD risk factor	
Correct	76.5
High blood sugar puts strain on the heart	
Correct	68.6
High blood sugar for several months → increased cholesterol and increases CVD risk	
Correct	62.7
A person w/ diabetes can lower CVD risk by managing BP	
Correct	68.6
A person w/ diabetes can lower CVD risk by managing weight	
Correct	64.7
Awareness Items	
CVD is the leading cause of death for both men and women in the U.S.	
Correct	51
Women are more likely to die from breast CA than CVD	
Correct	51
Men and women experience many of the same HA symptoms	

Correct	39.2
Men w/ diabetes have a higher CVD risk than women w/ diabetes	
Correct	9.8
More men than women die from CVD annually	
Correct	58.8
Men and women experience all the same HA symptoms	
Correct	90.2
Almost all people who suffered HAs experienced a "tingling" sensation in their left arm	
Correct	42.1
Women experiences HA symptoms uncommon in men	
Correct	66.7
Signs & Symptoms Items	
Jaw pain is S&S	
Correct	62.7
Feeling weak, lightheaded or faint is a S&S	
Correct	92.2
Breaking out in a cold sweat is a S&S	
Correct	70.6
Feeling nauseous is a S&S	
Correct	64
Swelling of feet/legs is a S&S	
Correct	51

Chest pain/discomfort is a S&S	
Correct	98
Chest pressure/pain that lasts a few min. or goes away and returns is a S&S	
Correct	86.3
Sudden trouble seeing in one/both eyes is a S&S (stroke)	
Correct	13.7
Tingling in fingers/toes is a S&S (stroke)	
Correct	6
Pain/discomfort in one/both arms is a S&S	
Correct	88.2
Shortness of Breath is a S&S	
Correct	96.1
Family History Items	
Has a 1st degree male relative who suffered a HA before age 55	5.9
Has a 1st degree female relative who suffered a HA before age 65	2
Both parents suffered CVD before age 55	0
One/both parents have high BP	29.4
One/both parents have high cholesterol	23.5
One/both parents have Type II diabetes	5.9

Table 2: Summary Scores and Survey Items vs. Sex

The mean and standard deviation was reported for continuous variables while frequencies of correct answers were reported for categorical variables between the two sexes.

***p-value < 0.05**

Variable	Male (Mean +/- s.d.)	Female (Mean +/- s.d.)	p-value
Perceived Health Risk Summary Score (range: 0-40)	8.2 +/- 4.0	8.4 +/- 5.8	0.92
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Diet Summary Score (range: 0-89)	30.8 +/- 7.9	28.3 +/- 7.9	0.33
BMI	24.0 +/- 3.6	23.3 +/- 3.9	0.64
	Male (%)	**Female (%)**	**p-value**
Met PA Guidelines	71.4	72.2	0.96
Current Health Status			
Fair	7.1	16.7	**0.03***
Good	78.6	33.3	
Very good	7.1	41.7	
Excellent	7.1	8.3	
CVD is the leading cause of death for both men and women in the U.S.			
Correct	42.9	55.6	0.420
Women are more likely to die from breast CA than CVD			

Correct	64.3	47.2	0.278
Men and women experience many of the same HA symptoms			
Correct	71.4	27.8	**0.005***
Men and women experience all the same HA symptoms			
Correct	28.6	72.2	**0.005***
More men than women die from CVD each year in the U.S.			
Correct	0	5.6	0.386
Women experiences HA symptoms uncommon in men			
Correct	50	72.2	0.136
Likely to suffer from HA/stroke in future			
Little/no PR	21.4	22.2	0.978
Low PR	35.7	33.3	
Mild PR	35.7	33.3	
Moderate PR	7.1	11.1	
Breaking out in a cold sweat is a S&S			
Correct	85.7	63.9	0.131
Feeling nauseous is a S&S			
Correct	92.9	51.4	**0.007***
Chest pressure/pain that lasts a few min. or goes away and returns is a S&S			
Correct	78.6	88.9	0.345
Sudden trouble seeing in one/both eyes is a S&S (stroke)			
Correct	7.1	16.7	0.384
Tingling in fingers/toes is a S&S (stroke)			
Correct	14.3	2.9	0.132

Table 3: Summary Score Correlations

Correlation Coefficients (R^2) for all summary scores

***p-value<0.05**

	Perceived Health Risk Summary Score	**Family History Summary Score**	**Awareness Summary Score**	**Knowledge of Risk Factors Summary Score**	**Signs & Symptoms Summary Score**	**Diet Summary Score**	**BMI**
Perceived Health Risk Summary Score		**0.318***	-0.100	-0.136	0.039	**0.376***	**0.288***
Family History Summary Score	**0.318***		0.086	0.060	0.008	-0.033	0.081
Awareness Summary Score	-0.100	0.086		**0.425***	0.214	-0.190	-0.194
Knowledge of Risk Factors Summary Score	-0.136	0.060	**0.425***		**0.357***	-0.058	**-0.339***
Signs & Symptoms Summary Score	0.039	0.008	0.214	**0.357***		0.244	-0.102
Diet Summary Score	**0.376***	-0.033	-0.190	-0.058	0.244		0.011
BMI	**0.288***	0.081	-0.194	**-0.339***	-0.102	0.011	

Table 4: Perceived Health Risk vs. Predictors of Perceived Health Risk

All predictors of perceived health risk compared to the perceived health risk summary score.

P-values are reported for continuous variables (summary scores) and mean, standard deviation, and correlation coefficients (R^2) are reported for the categorical variables (Met PA Guidelines and Current Health Status)

***p-value < 0.05**

Continuous Variables			
	Perceived Health Risk Summary Score (p-value)		
Family History Summary Score	**0.023***		
Awareness Summary Score	0.486		
Knowledge of Risk Factors Summary Score	0.341		
Signs & Symptoms Summary Score	0.786		
Diet Summary Score	**0.007***		
BMI	**0.050***		
Categorical Variables			
	Perceived Health Risk Summary Score (p-value)		
Met PA Guidelines	0.129	**Met PA Guidelines (Mean +/- s.d.)**	10.5 +/- 6.0
		Did Not Meet PA Guidelines (Mean +/- s.d.)	7.8 +/- 5.3
Current Health Status	**<0.0001***	**Current Health Status (Mean +/- s.d.)**	
		Fair	15 +/- 5.0

		Good	9.5 +/- 4.7
		Very good	5.4 +/- 3.6
		Excellent	2.3 +/- 1.3

Table 5: Summary Score Ranges
Possible range of scores for participants compared to actual ranges of scores observed in participants.

	Possible Range of "Points"	**Actual Range of "Points" for Participants**
Perceived Health Risk Summary Score	0-40	0-24
Family History Summary Score	0-6	0-3
Awareness Summary Score	0-8	0-7
Knowledge of Risk Factors Summary Score	0-18	9-18
Signs & Symptoms Summary Score	0-11	3-10
Diet Summary Score	0-89	10-43

Discussion:

My study participants consisted of fourteen males (28%) and thirty-six females (72%), with an overall sample size of n=50. A majority of participants were white (88%) or Asian (18%), and non-Hispanic/Latino (94%) (Table 1). These demographics are not representative of OSU's current student population and limit the generalizability of these data.

1) **Are people in a CVD low-risk category knowledgeable and aware of the risk factors and signs and symptoms for both men and women associated with cardiovascular disease, as well as the additional symptoms experienced by women during heart attacks?**

My findings suggest OSU students are equally unaware of CVD risk and signs and symptoms of MIs for both sexes in America and awareness does not differ significantly between males and females. Participants displayed moderate to high knowledge of CVD risk factors and signs and symptoms of heart attacks but relatively low awareness of CVD risk in America. These data are consistent with our hypotheses that OSU students would display moderate knowledge and awareness.

2) **What is the perceived CVD health risk of cardiovascular disease for people in a low-risk category, and does it vary by variables such as family history, current health**

status, age, knowledge, and/or awareness? Do predictors of perceived health risk vary by sex?

As predicted, perceived CVD health risk for OSU students was relatively low and significantly correlated to a family history of CVD and poorer current health status. Additionally, knowledge of risk factors was significantly correlated to greater awareness of CVD risk, greater knowledge of signs and symptoms of heart attacks, and higher BMI. None of these predictors varied significantly by sex. The restricted age range of participants precluded analysis by age.

3) **How is perceived CVD health risk associated with resulting health behavior for these individuals?**

Perceived CVD health risk was significantly correlated to a less healthful diet and a higher BMI. Smoking was not considered as a variable due to the absence of current smokers in the sample study. Physical inactivity was not significantly correlated to perceived CVD health risk. These findings are inconsistent with our predictions that participants with higher perceived CVD health risk would engage in positive health behaviors (e.g. healthier eating, engagement in regular physical activity).

Analyzing Specific Items:

Participants appeared unaware of the overlap in MI symptoms between men and women, despite correctly understanding that men and women do not experience all the same symptoms of a heart attack. Furthermore, a significant difference was observed between men and women's answers to the items regarding men and women experiencing "many of the same" versus "all the same" symptoms of a heart attack. While there was not a statistically significant difference between men and women who correctly answered "Women experience HA symptoms uncommon in men," men displayed a 1:1 ratio of correct to incorrect answers to this item while women displayed a 3:1 ratio.

Only 9.8% of respondents recognized that risk factors, such as Type 2 diabetes, present a higher risk for CVD in women than men, suggesting OSU students are unaware that certain risk factors for CVD present higher risks in women than men. Similarly, men and women differed in the proportion who correctly identified that nausea is a sign of MIs in women (92.9% of men versus 51.4% of women).

Fewer than half of respondents were able to correctly identify that high HDL is not a risk factor for CVD. Just over half of respondents correctly recognized that CVD is the leading cause of death for both men and women in the U.S. and that women are more likely to die from CVD than breast cancer in the U.S.. These items did not, however, differ significantly by sex.

Two signs and symptoms consistent with strokes, rather than MIs, were included in the survey's "Signs & Symptoms" section to assess students' ability to differentiate between the signs and symptoms of cardiovascular events other than heart attacks. Fewer than 15% of participants correctly identified these signs and no statistically significant differences were observed between men and women on these items.

These data are consistent with similar surveys that analyzed American college students' knowledge and awareness of CVD risk and suggest perceived CVD health risk was low due to age, awareness of CVD risk for this age group in America was below that which might be expected[10], while knowledge of risk factors was moderate due to education level[11]. Awareness of

CVD and students' perceived health risk did not differ significantly by gender[10], while knowledge of CVD risk factors was not analyzed by sex in these studies[11].

Limitations:

My survey was cross-sectional study and is thus restricted to observing students' knowledge, awareness, perceptions, and health behavior at one point in time. I cannot analyze any of these factors over a period of time, and so cannot determine cause and effect or temporal order. The survey relies on self-report, which may not be an accurate representation of the students' knowledge, awareness, perception, or health behavior, however, the constructs under investigation are inherently the perceptions and knowledge of individuals, so there is no alternative to self-report. Our study is limited to a small volunteer sample of OSU students in a health related course, which may not be generalizable to college student across the nation, or even OSU itself. This small sample size reduced our ability to identify group differences, especially when considering the ratio of male to female participants (14:36).

Revision of some "Awareness" items might have better assessed awareness of cardiovascular disease and heart attack risks in both men and women in America. Specifically, the items "Men and women experience all the same HA symptoms" and "More men than women die from CVD each year in the U.S." (Table 2). The intent behind the first item was to assess whether or not participants were aware that men and women do not experience entirely consistent symptoms of a myocardial infarction, but it could have been misinterpreted that men and women do experience the same symptoms (ex. chest pain and shortness of breath) but women experience additional symptoms that are not commonly observed in men. Thus, I would re-phrase this item to read, "Men and women experience a significant overlap in the signs and symptoms commonly experienced during a heart attack."

A number of sources reporting CVD deaths in men and women over the last decade report contradictory data that suggest a slightly greater number of men die from CVD annually than women. Thus, re-phrasing this item to read "Men suffering from CVD in the U.S. die at a greater rate than women suffering from CVD in the U.S.," in which case the correct answer would be "True" might have been more accurate.

Implications:

The data provided from this study suggests OSU students are fairly unaware of the CVD risks for both men and women in the U.S., some of the risk factors for CVD and their increased potency in women, the signs and symptoms more common to women experiencing heart attacks, and the signs and symptoms of MIs versus other cardiovascular events (i.e. strokes). This survey provided useful information of current awareness and knowledge of OSU students concerning CVD in America, and may reflect knowledge and awareness in college students throughout Oregon and the nation. The insight gained from this research study helps evaluate where Oregon and America's CVD education and outreach efforts are falling short, especially in regards to differences in knowledge and awareness between men and women. Studies such as this will hopefully help Americans to ultimately reach the goal of reducing heart disease incidence through primary prevention.

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