Cardiovascular Disease (CVD) Risk: Should We Target College Women?

Devan R. Romero, Shari McMahan, Michelle Cathorall

California State University Fullerton

Abstract

Recent changes by the American Heart Association identify screening guidelines for CVD risk factors for those in their early twenties. Research on CVD has focused on adult populations 40 and over. If risk is identified at an earlier age, then preventative behaviors can be established to prevent the onset and prevalence of CVD. This study was conducted to identify college students' awareness of early screening for and knowledge of CVD risk factors. Specifically, this study examined differences between men, women, and risk perception. Participants were 403 college students (male = 137; female = 266) between the ages of 18 and 25 that completed a questionnaire measuring knowledge and awareness of CVD risk. Results showed that college students had limited knowledge of CVD risk, specifically signs and symptoms. A majority of the participants identified awareness of early screening guidelines. Women rated cancer as the leading cause of death more frequently than men did. Further results indicated men continue to be more knowledgeable and aware of CVD risk. Practitioners and health educators need to use existing literature and new CVD guidelines in the United States to develop prevention programs and strategies. Prevention strategies and education should be specifically targeted toward young women and adults.

Keywords: CVD, college, student, risk

Cardiovascular disease (CVD) is the leading cause of death among both men and women in the United States (Higgins, Province, Heiss, Eckfeldt, Ellison, Folsom, et al., 1996). In the year 2000, 54% of deaths in the United States were attributed to CVD alone (American Heart Association, 2003). According to the World Health Organization (WHO), 16.6 million people around the globe die of CVD each year (2004). The WHO estimates that by the year 2010 CVD will be the leading cause of death in developing countries and by the year 2020 will be the cause of 25 million deaths worldwide (2004).

Atherosclerosis begins early in life and screening for cardiovascular disease should begin in adolescence (Navas-Nacher, Colangelo, Beam, Greenland, 2001). Recent changes from the American Heart Association (2003), suggest screening should begin at the age of 20. Early identification and modification of lifestyle behaviors that put one at risk for heart disease could prevent the onset of the disease (Green, Grant, Hill, Brizzolara, and Belmont 2003). Risk factors of CVD include positive family history of CVD, high blood pressure, high cholesterol levels, physical inactivity, a high-fat diet, smoking, excessive drinking, obesity, and diabetes mellitus (Anding, Kubena, McIntosh, O'Brien, 1996; Lipp, Deane, & Trimble, 1996; Navas-Nacher, et al., 2001; Raitakari, Leino, Raikkonen, Porkka, Taimela, Rasanen, et al., 1995).

CVD is primarily a disease of slow progression; therefore, prevention at a younger age can result in protection from disease (Green et al., 2003; Navas-Nacher et al., 2001). According to Raitakari (1995), CVD begins in childhood due to behaviors that accelerate the development of disease; as such, establishing preventative behaviors is crucial early in life. When the onset of CVD has already occurred, it is equally important to identify the presence and intervene to stop further development of the disease

(Pearson, Blair, Daniels, Eckel, Fair, & Fortmann, et al., 2002). Signs and symptoms of CVD include chest pain, pain in areas of upper body, abdominal discomfort, breathing difficulty, heart burn, nausea, dizziness, rapid heart rate, and depression (American Heart Association, 2003; National Heart, Lung, and Blood Institute, 2003).

Past research and outreach on CVD in young adults has focused on intervention as opposed to prevention (Manson, Tosteson, Ridker, Satterfield, Herbert, & O'Connor, 1992). Those who have already been diagnosed with CVD receive information and education on changing at-risk behaviors (Labarthe, 1999; Meischke, Kuniyuki, Yasui, Bowen, Andersen, & Urban, 2002). Most primary prevention efforts have been focused on adult populations (Lipp et al. 1996). Guidelines on risk prevention and prediction in adults younger than 40 is incomplete due to limited research on this population (Cleeman & Grundy, 1997; Garber & Browner, 1996; Garber & Browner, 1997).

Younger adults possess limited knowledge and awareness of CVD risk and screening protocol; therefore, preventative measures cannot be taken if there is not a perceived risk of developing CVD (Frost, 1992; Green et al., 2003; Oliver-McNeil & Artinian, 2002; Tamragouri, Martin, Cleavenger, & Sieber, 1986). Green et al. (2003) found that college students do not accurately perceive their risk for developing heart disease. Frost (1992) indicated that college students who possess some knowledge of CVD risk factors do not reflect the integration into lifestyle behaviors. It is important that college students are aware of their risk for CVD and are knowledgeable of lifestyle behaviors that reduce risk because "College represents the last formal structure for education" and is the time when "independent living is being developed and health awareness might also be heightened" (Frost, 1992, p. 17).

As mentioned above, college students between the ages of 18-25 are unaware of CVD and ways to decrease this risk. Although both men and women appear to be equally limited in knowledge and awareness, this is not the case. Men are more aware and knowledgeable about the disease (Wenger, 1999). There is limited research and information in the area of CVD prevalence and incidence in women (Biswas, Calhoun, Bosworth, & Bastian, 2002; Wenger, 1993, Wenger, 1997; Witt & Roger, 2003). Wenger (1998) indicated that research of CVD has predominately involved male participants and results of these studies geared warnings publicly toward the male population. Males are over-treated while females are under-treated in regards to prevention and intervention (Kitler, 1994). In addition, the occurrence and diagnosis of CVD is less straightforward in women than in men because women are more likely to experience atypical signs and symptoms such as abdominal discomfort, low back pain, and depression (Duvernoy & Mosca, 1999).

Women do not perceive CVD as a significant health risk because they are not well informed of their risk (Mosca, Jones, King, Ouyang, Redberg, Hill, et al., 2000). A major misconception among women is that they perceive cancer, specifically breast cancer, as the greatest risk to their health (Mosca et al., 2000). CVD is the leading cause of death among men and women, yet women represent an increasingly larger proportion of the population with CVD. The increased prevalence in women is due to women's longer life expectancy compared to men; although men develop CVD earlier in life, more women acquire the disease overall (Heim & Brunsell, 2000). Oliver-McNeil and Artinian (2002) reported that women underestimate their risk for CVD and therefore they do not take the necessary steps to reduce risk and change lifestyle behaviors. Wenger (1999) indicated that because few women consider CVD as a risk, they are unlikely to regard preventative and diagnostic messages across the life span unless sex-specific information about CVD is provided.

It is vital to our nation's health to educate both men and women regarding the incidence and prevalence of CVD specific to their sex. The identification of CVD is a crucial part of preventing further progression of the disease in both men and women and guidelines for younger adults need to be established. The combination

of limited research of CVD in the college-aged population and on women contributes to the lack of knowledge and awareness of CVD risk (Mosca et al., 2000).

The purpose of this study is to identify students' awareness of early screening for CVD and knowledge of CVD risk factors, specifically, examine any differences between men and women, and risk perception.

Methods

Participants

The participants were 403 students enrolled in various sections of an introductory personal health class at a mid-sized California state university. The participants were between the ages of 18-25. There were 434 participants surveyed and of those 31 were excluded due to age criteria and missing information. Of the 403 surveys remaining for analysis there were 137 male and 266 female participants surveyed. The criterion for participation in the study was that the student must be enrolled in a personal health course. The students were required to read and take home an Informed Consent Form approved by the Institutional Review Board (IRB).

Measures

A survey created based on review of existing literature was used to measure awareness of CVD screening and knowledge of cardiovascular disease risk factors among college students, as well as differences in risk perception between men and women. The survey consisted of five pages and 52 questions grouped into six categories: knowledge and risk perception, medical facility use and communication with physician, nutrition, physical activity, living conditions, and family history. The survey included five-point Likert-type questions, closed-ended questions, and a demographic section. Of the 52 items in the survey, only 20 items were analyzed and included in the results. The other 32 items were included as part of a larger study on CVD. The 20 items were separated in the following categories.

Demographics

Demographics for personal information consisted of age, sex, race, and class level. Family history of disease was assessed and only for the purpose of the study, only those who identified CVD were included. Personal history of the participants included rating their health status and if ever informed of personal CVD risk.

Perceived Susceptibility

To identify whether or not college students perceived themselves susceptible to CVD risk and onset of disease, they were asked to rate risk compared to other people their age. The Likert-type scale included five levels ranging from very likely to unlikely for risk of developing disease.

Knowledge

To identify the background knowledge of CVD and awareness of screening guidelines the following questions were included: signs and symptoms of the disease, ways to reduce your risk, at what age screening should begin, and what is the leading cause of death in U.S.

Behavior Intention

To identify behavior change, a five-point Likert-type scaled question was used and possible answers varied from very likely to unlikely. The question asked if ever informed of risk, how likely it is that participants would change their current lifestyle.

Validity and Reliability

Five health promotion experts with scientific and technical training and published in the health education field reviewed the survey. The experts gave feedback regarding necessary changes in order to establish face validity. Reliability was tested using the parallel form method. A parallel form of the survey was created and administered to two stress management classes. Pearson product moment correlation was used to determine reliability coefficient of questions one through six and their parallel counterparts. The correlations of the questions using a bivariate two-tailed test were as follows: 1) rate health ($r = .49$), 2) compare risk ($r = .52$), 3) report weight ($r = .34$), 4) informed of risk ($r = .30$), 5) rate diet ($r = .65$),

and 6) engage in activity (r = .78). Question six was the most reliable question and had the highest correlation.

Procedures

Professors of each of the nine personal health courses were contacted before the start of the fall semester via email and asked to participate in the study. Eight professors replied and agreed to allow the classes to be surveyed. A tenth section was an online course, but was excluded in the study due to issues of instrumentation and survey conversion. The survey was administered in the assigned classroom of each section during the first 15 minutes of class. If the student was late to class it was then under the professors discretion if participation would be allowed. All class sections were surveyed during the first and second weeks of the Spring 2004 semester to avoid content on the topic provided in the class.

Participants were given the opportunity to participate in the study on a volunteer basis only. Researchers instructed the students to read the IRB Consent Form and take it home with them. The students were allowed 15 minutes to complete the survey once it was administered. The researcher only explained to the students that the survey is part of a study examining health risks in college students. The participants were instructed to raise their hand if there were any questions regarding the directions or items in the survey. Participants were also instructed to not obtain information from any resources on hand and were not allowed to talk with other participants until the survey was collected. The researcher collected all the surveys when the participants were finished.

Data Analysis

All information from the survey was classified as data and was statistically analyzed using SPSS Version 11.0 for Windows. Descriptive statistics were obtained for the demographics and family history of participants in the study.

Results

Participant Characteristics

Of the participants surveyed, 33.9% were male (n = 137) and 66.0% were female (n = 266). The average mean age for men and women was 19.4 years with a standard deviation of 1.31 years, respectively. Fifty-three percent of the participants were sophomores (n = 214), 24 % were freshman (n = 95), 16% were juniors (n = 66), and 7% were seniors (n = 28). Of the sample 38% of the participants were White (n = 153), 31% Hispanic (n = 124), 18% Asian (n = 72), and 13% other (n = 54). This distribution was similar to the sex and racial demographics of students attending the university and its geographic region as reported from results of a survey as 38% White, 26% Asian, 22% Hispanic, 14% other, 39% male, and 61% female (California State University Fullerton, 2004).

Family History of CVD

Of the participants who identified a family history of CVD, 4.2% listed their grandmother (n = 17), 19% listed their grandfather (n = 45), 0.7% listed their mother (n = 3), and 4 % listed their father (n = 16). Chi-square analysis was used to examine any relationships between sex and family history. There was not a significant relationship found between men and women and reported family history of CVD.

Health Status Rating

The majority of participants rated their health as good (48.6%) (n = 196) while almost equal percentages rated theirs as fair (19.6%) (n = 79) and very good (21.8%) (n = 88). Only 4.2% of the participants rated their health status as excellent (n = 17), 5% poor (n =20), and 0.5% did not know (n = 2) (see Table 1). An independent-samples t-test was used to analyze sex differences between participant's health ratings. Men rated their health status higher in terms of excellence than women who tended to rate themselves in the lower health range ($t(402) = 2.40$, $p = .01$, $df = 400$).

Table 1
Rate Health

Status	Men Frequency	Women Frequency	Total Frequency
Excellent	10 (7.3%)	7 (2.6%)	17 (4.2%)
Very Good	43 (31.3)	45 (16.9%)	88 (21.8%)
Good	57 (41.6%)	139 (52.2%)	196 (48.6%)
Fair	15 (11.0%)	64 (24.0%)	79 (19.6%)
Poor	11 (8.0%)	9 (3.4%)	20 (5.0%)
Don't Know	0 (0%)	2 (0.8%)	2 (0.5%)

Leading Cause of Death in U.S.

Thirty-nine percent of participants chose cancer as the leading cause of death in the United States (n = 158), 26.1% chose CVD (n = 105), 23.3% chose accidents (n = 94), 5.7% chose diabetes (n = 23), .2% chose influenza (n = 1), 2% chose chronic obstructive pulmonary disease (n = 1), and 5.2% failed to answer the question (n = 21) (listed in Table 2). Chi-square analysis was used to analyze sex differences between sex and those who chose CVD as the leading cause of death in the U.S. More men rated CVD as the leading cause of death (36%) (n = 48) compared to women (23%) (n = 57) and 77% of women rated some other leading cause of death (n = 191) (χ^2 (1, N = 403) = 7.19, p = .00). Chi-square was also used to analyze differences between sex and all leading causes of death (χ^2(6, N = 403) = 19.04, p = .04). Of significance is the frequency of women (74.7%) to report cancer as the leading cause of death (n = 118), as compared to the 25.3% of men who selected cancer (n = 40).

Table 2
Leading Cause of Death in U.S.

Cause	Men Frequency	Women Frequency	Total Frequency
Cardiovascular Disease	48 (35%)	57 (21.4%)	105 (26.1%)
Cancer	40 (29.2%)	118 (44.4%)	158 (39.2%)
Chronic Obstructive Pulmonary Disease	0 (0%)	1 (0.4%)	1 (0.2%)
Accidents	37 (27.0%)	57 (21.4%)	94 (23.3%)
Diabetes	8 (5.8%)	15 (5.6%)	23 (5.7%)
Influenza	1 (0.7%)	0 (0%)	1 (0.2%)
Missing	3 (2.2%)	18 (6.8%)	21 (5.2%)

Risk of CVD Compared to Others

Participants were asked to compare the likeliness of developing CVD with people their age. The sample appeared to be optimistic with 41.7% rating themselves as unlikely (n = 168), 35.5% rated somewhat likely (n = 143), 11.2% rated very unlikely (n = 45), 7.7% rated likely (n = 31), .7% rated very likely (n = 3), and 3.2% did not respond (n = 21). There were not a significant relationship found between men and women and compared risk of CVD to others of the same age.

Informed of CVD Risk

When asked if they were ever told if they were at risk for developing CVD, 92.1% of participants answered “no” (n = 371) and 5.0% marked “yes” (n = 20) (listed in Table 3). Chi-

square analysis was used to examine sex differences and if participants had ever been informed of CVD risk. Eight percent of the men who answered yes (n = 11) and only 3.5% of women answered yes to being told they are at risk (n = 9). Men were told of CVD risk more commonly than women ($\chi^2(1, N = 403) = 3.91$, $p = .05$). In addition, it should be noted that over 90% of both men and women reported never being informed of CVD risk.

Table 3
Informed of CVD Risk

	Men Frequency	Women Frequency	Total Frequency
Yes	11 (8.0%)	9 (3.4%)	20 (5.0%)
No	124 (90.5%)	247 (92.9%)	371 (92.1%)

Behavioral Intention

Almost half of the participants (45.4%) reported that they would be very likely to change their lifestyle if doctor informed them that they were at risk (n = 183), while 33% listed likely (n = 133), 13.4% marked somewhat likely (n = 54), 2.2% listed unlikely (n = 9), .7% reported very unlikely (n = 3), and 5.2% did not respond (n = 21). There was no significance differences found between men and women and how likely they would change their lifestyle if informed at risk for CVD.

Awareness of Early Screening Guidelines

Participants were asked to identify at what age screening for CVD should begin. Thirty-four percent of participants chose age 20 (n = 139), 20% listed adolescents (n = 79), and 8% answered childhood (n = 34), thus 62% of participants determined screening should begin at a younger age. Responses were separated 0-20, and above, and compared between men and women. There were no significant differences found between men and women and at what age they believed screening should begin.

Knowledge of Signs and Symptoms of CVD

Participants were asked to list three signs and symptoms of a heart attack to assess CVD knowledge. The responses were coded based on correct, missing, and other. The responses coded "other" were categorized as incorrect and combined with the missing items to describe results. The total number of correct responses for all participants was 456, while the total number of missing and other responses totaled 791. Of the most commonly listed signs and symptoms, chest pain was chosen by 35.5% of participants (n = 143) and shortness of breath by 30.3% (n=122). Not all other signs and symptoms were listed as frequently (see Table 4).

Responses were divided and percentages were calculated between men and women. Chest pain was reported by 38.7% of men (n = 53) and 33.8% of females (n = 90). Pain in the areas of the upper body (17.7%) (n = 47) was reported more frequently by women. Both men (30.7%) (n = 42) and women (30.1%) (n = 80) reported shortness of breath similarly. One male reported abdominal discomfort (0.7%) and 8.8% of men reported tiredness/fatigued/exhausted (n =12) which are atypical signs usually experienced in women (0.7%). Interestingly, most atypical signs and symptoms such as tiredness/ fatigued/ exhausted, nausea/ vomiting, abdominal discomfort, pain in jaw, dizzy/ lightheadedness, and rapid pulse/heart palpitations were reported minimally, if at all. A more common sign and symptom of heart attack, indigestion or heartburn, was only reported one time by a woman.

Table 4
Signs and Symptoms of CVD

Signs/Symptoms	Men Frequency	Women Frequency	Total Frequency
Chest Pain	53 (38.7%)	90 (33.8%)	143 (35.5%)
Pain In Areas Of Upper Body (back, arm, neck)	21 (15.3%)	47 (17.7%)	68 (16.9%)
Shortness of Breath	42 (30.7%)	80 (30.1%)	122 (30.3%)
Tiredness/Fatigued/Exhausted	12 (8.8%)	15 (5.6%)	27 (6.7%)
Nausea/Vomiting	1 (0.7%)	2 (0.8%)	3 (0.7%)
Dizzy/Lightheadedness	8 (5.8%)	16 (6.0%)	24 (6.0%)
Pain in Jaw	0 (0%)	2 (0.8%)	2 (0.5%)
Indigestion/Heart Burn	0 (0%)	1 (0.4%)	1 (0.2%)
Abdominal Discomfort	1 (0.7%)	0 (0%)	1 (0.2%)
Rapid Pulse/Heart Palpitations	5 (3.6%)	0 (0%)	5 (1.2%)
Other	96 (70.1%)	123 (46.2%)	214 (53.1%)
Missing	165 (120.4%)	412 (154.9%)	577 (143.2%)

Knowledge of Risk Reducing Behaviors

To further assess CVD risk knowledge, participants were asked to list three ways they could reduce their risk for developing CVD. The responses were coded based on correct, missing, and other. The responses coded "other" were categorized as incorrect and combined with the missing items to describe results. The total number of correct responses for all participants was 754, while the total number of missing and other responses totaled 454 (listed in Table 5). The most chosen risk reducing behaviors were to increase physical activity (n = 307) and eat for heart health/watch diet (n = 296). The third and fourth highest rated behaviors, see doctor (n = 64) and stop smoking (n = 46) were substantially lower in frequency compared with increasing physical activity and eat for heart health/watch diet. All of the other "correct" behaviors were selected minimally and never exceeded at least 15 selections.

Table 5
Risk Reducing Behaviors

Behavior	Men Frequency	Women Frequency	Total Frequency
Decrease Blood Pressure	2 (1.5%)	1 (0.4%)	3 (0.7%)
Decrease Cholesterol	3 (2.2%)	6 (2.3%)	9 (2.2%)
Stop Smoking	17 (12.4%)	29 (10.9%)	46 (11.4%)
Lose Weight	0 (0%)	5 (1.9%)	5 (1.2%)
Increase Physical Activity	112 (81.8%)	195 (73.3%)	307 (76.2%)
Manage Stress	6 (4.4%)	9 (3.4%)	15 (3.7%)
Avoid Excessive Alcohol Intake	5 (3.6%)	4 (1.5%)	9 (2.2%)
Eat For Heart Health/Watch Diet	104 (75.9%)	192 (72.2%)	296 (73.4%)
See Doctor	20 (14.6%)	44 (16.5%)	64 (15.9%)
Other	29 (21.2%)	46 (17.3%)	75 (18.6%)
Missing	112 (81.8%)	267 (100.4%)	379 (94.0%)

When responses were separated between sex, men rated increase physical activity (81.8%) (n = 112), eat for heart health/watch diet (75.9%) (n = 104), and stop smoking (12.4%) (n = 17) more commonly than women. Sixteen and a half percent of women (n=44) rated see doctor higher than men (14.6%) (n = 20). Interestingly, of all participants who rated physical activity and diet most frequently for risk reducing behaviors, the majority of women (except for n = 5) and all of the men did not select lose weight. Decreasing blood pressure was the most infrequently selected behavior by men (1.5%) (n = 2) and women (0.4%) (n = 1) and was exceeded by decreasing cholesterol (n = 9). Women (2.3%) (n = 6) and men (2.2%) (n = 3) both similarly reported decrease cholesterol levels.

Discussion

The purpose of this study was to identify student's awareness of early screening guidelines for CVD and knowledge of CVD risk factors. Specifically this research examined any differences between men and women, and their risk perception. By analyzing various responses of particular questions in the survey, the hypotheses of this study were examined and many important findings have emerged.

Awareness of Early Screening Guidelines

There were no significant differences between men and women and awareness of early screening guidelines. The results could possibly be limited or uncertain because 62% identified screening should begin at a younger age (see Table 6). Of particular interest is that the screening guidelines that state screening should begin no later than age 20 have only been published for the past 3 years (AHA, 2002). The answers of the specific question may have implied social desirability to identify the younger age groups. According to Manchester, McDuffie, & Diamond (1989), screening guidelines in 1989 only advise selective screening for individuals under 20, particularly those who have a family history. The awareness of early screening guidelines in this population, according to the results, is accurate and corresponds with those of the American Heart Association.

Table 6
Age CVD Screening Should Begin

Age	Men Frequency	Women Frequency	Total Frequency
Childhood	10 (7.3%)	24 (9.0%)	34 (12.8%)
Adolescents (teens)	28 (20.4%)	51 (19.2%)	79 (19.6%)
20s	48 (35.0%)	91 (34.2%)	139 (34.5%)
30s	33 (24.1%)	60 (22.6%)	93 (23.1%)
40s	14 (10.2%)	20 (7.5%)	34 (8.4%)
50s	1 (0.7%)	5 (1.9%)	6 (1.5%)
Missing	3 (2.2%)	14 (5.3%)	17 (4.2%)

Family History of CVD

A family history of CVD was reported in less than 30% of the participants, no significant differences were found between men, and women (see Table 4). There may be a higher rate of family history of CVD among the participants that was not reported. Because CVD presents itself later in life, the family members may still be unaware of disease manifestation or the disease has not yet been identified. Tamragouri et al. (1986) found that a parental history of CVD does not necessarily result in a higher knowledge of CVD prevalence and that most students were unaware of a history of disease.

Leading Cause of Death in the U.S.

Cancer was most frequently rated as the leading cause of death in the United States, closely followed by CVD and accidents (see Table 4). When separated men rated CVD more often than women, who when compared to men rated cancer 74.7 % more. Robertson (2001) reported that women believe cancer is still the leading health threat and the younger generation is even more convinced of this belief. According to Oliver-McNeil and Artinian (2002), women perceive breast cancer as a higher health risk than CVD due to women's health issues historical focus on cancer.

Knowledge of Signs and Symptoms of CVD

Knowledge of signs and symptoms of CVD were limited (see Table 7). Out of the 456 correct responses, 35.5% were chest pain followed by 30.3% who identified shortness of breath as a sign or symptom of a heart attack. Men (38.7%) reported chest pain more commonly than women (33.8%), as well as shortness of breath (30.7%). More women reported pain in areas of the upper body (17.7%) than men (15.3%). Interestingly, the participants minimally reported atypical signs or symptoms. Of importance is the lack of knowledge in women of signs and symptoms, particularly those specific to their sex. Duvernoy and Mosca (1999) reported that sex-related differences exist in the presentation of CVD and women more commonly experience atypical symptoms; therefore, there is a need to educate sex-specifically.

Table 7
Signs and Symptoms of CVD

Sign/Symptom	Men Frequency	Women Frequency	Total Frequency
Chest Pain	53 (38.7%)	90 (33.8%)	143 (35.5%)
Pain in Areas Upper Body (back, arm, neck)	21 (15.3%)	47 (17.7%)	68 (16.9%)
Shortness of Breath	42 (30.7%)	80 (30.1%)	122 (30.3%)
Tiredness/Fatigued/Exhausted	12 (8.8%)	15 (5.6%)	27 (6.7%)
Nausea/Vomiting	1 (0.7%)	2 (0.8%)	3 (0.7%)
Dizzy/Lightheadedness	8 (5.8%)	16 (6.0%)	24 (6.0%)
Pain in Jaw	0 (0%)	2 (0.8%)	2 (0.5%)
Indigestion/Heartburn	0 (0%)	1 (0.4%)	1 (0.2%)
Abdominal Discomfort	1 (0.7%)	0 (0%)	1 (0.2%)
Rapid Pulse/Heart Palpitations	5 (3.6%)	0 (0%)	5 (1.2%))
Other	96 (70.1%)	123 (46.2%)	214 (53.1%)
Missing	165 (120.4%)	412 (154.9%)	577 (143.2%)

Knowledge of Risk Reducing Behaviors

Risk reducing behaviors were asked to be identified among the sample. A higher response rate was exhibited as compared to knowledge of signs and symptoms. The most commonly reported risk-reducing behaviors were increasing physical activity (76.2%) and eating for heart health or watch diet (73.4%) (see Table 8). Only 11.4% of participants reported to stop smoking and was succeeded by see doctor (15.9%). The results indicate that the younger population has limited knowledge regarding certain risk factors that contributes to CVD. Navas-Nacher et al. (2001) indicated that high blood pressure, high cholesterol levels, and cigarette smoking are

predictive risk factors that are related to death from CVD. Anding et al. (1996) reported cigarette smoking, obesity, and high cholesterol levels as the most commonly reported CVD risk factors throughout their research sample.

Table 8
Risk Reducing Behaviors

Behavior	Men Frequency	Women Frequency	Total Frequency
Decrease Blood Pressure	2 (1.5%)	1 (0.4%)	3 (0.7%)
Decrease Cholesterol	3 (2.2%)	6 (2.3%)	9 (2.2%)
Stop Smoking	17 (12.4%)	29 (10.9%)	46 (11.4%)
Lose Weight	0 (0%)	5 (1.9%)	5 (1.2%)
Increase Physical Activity	112 (81.8%)	195 (73.3%)	307 (76.2%)
Manage Stress	6 (4.4%)	9 (3.4%)	15 (3.7%)
Avoid Excessive Alcohol Intake	5 (3.6%)	4 (1.5%)	9 (2.2%)
Watch Diet/Eat Heart Healthy	104 (75.9%)	192 (72.2%)	296 (73.4%)
See Doctor	20 (14.6%)	44 (16.5%)	64 (15.9%)
Other	29 (21.2%)	46 (17.3%)	75 (18.6%)
Missing	112 (81.8%)	267 (100.4%)	379 (94.0%)

Only 0.7% of participants reported decreasing blood pressure and 2.2 % chose decreasing blood cholesterol levels; therefore demonstrating a significant need to inform this population regarding CVD risk factors and specifically smoking cessation and decreasing blood pressure and cholesterol levels. There were no significant difference found between men and women and knowledge of risk reducing behaviors associated with CVD.

Health Status Rating

The majority of the participants rated their current health status as good (48.6%) (see Table 3). Of significant difference is that men tended to rate their health more optimistically ("excellent" and "very good") than women who more inclined to rated themselves in the lower range ("good", "fair", and "poor"). When ask to compare the likeliness of developing CVD with people of their age, participants were optimistic with 41.7% rating themselves as unlikely. Green et al. (2003) indicated that college men and women do not accurately perceive their risk for developing heart disease. Although women did rate themselves at a higher risk than men and others their age, overall they still rated themselves positively. The optimism of CVD risk may be in part due to the lack of heart disease risk perception as mentioned previously in the review of literature using the Health Belief Model. As described by Green et al. (2003) "one must first perceive and understand the actual risks before one can act to make the appropriate choices that will result in reduction of risk" (p. 207), college students need to be informed in order to have a perceived susceptibility.

Informed of CVD Risk

An interesting finding in this study is that 92.1 % of the participants have never been told they were at risk for CVD (see Table 6). Those who answered yes (5%) were mainly men. As noted by Wenger (1998), physicians still misperceive CVD as the leading cause of death in women and furthermore fail to inform the majority. Frost (1992) suggested that because students seek health information from traditional sources, physicians have a unique opportunity to communicate and address CVD risk.

Behavioral Intention

Almost half of the participants (45.4%) reported they would be very likely to change their lifestyle if informed they were at risk for developing CVD (see Table 7). The results of this variable further supports the Health Belief Model in that if one perceives themselves at risk, then they will be apt to change at-risk behaviors.

Summary of Younger Population and CVD Risk

According to the results previously mentioned, college students have limited knowledge regarding CVD risk; therefore, the second research hypothesis was accepted. From this study, a need for increased knowledge in certain areas has been identified. More of the younger population needs to be aware of the atypical signs and symptoms of CVD and those specific to their sex. Women must be aware of these atypical symptoms for proper diagnosis of CVD. The younger population lacks the knowledge of certain risk factors that significantly contribute to development of heart disease. Education regarding smoking cessation, decreasing blood cholesterol and blood pressure, and preventing obesity is needed to target CVD prevention in the younger population. Both men and women view cancer as the leading cause of death; therefore, it is vital for CVD prevention to increase knowledge regarding the severity of CVD.

Summary of Sex Differences in CVD Risk

A difference in risk perception existed between men and women, that is, women rated themselves at higher risk and in worse health status then men. Interestingly, women have not been as informed as men in the area of CVD risk. The misperception of women that cancer is a higher risk may be the reason they rated themselves more negatively. Ultimately, more research needs to be conducted using women participants and the findings then geared publicly toward women. Heim and Brunsell (2000) state that it is unclear what accounts for the differences of CVD between men and women. Sex differences and implications of such further have been disadvantaged due to the exclusion of women in most clinical trials.

Future Directions

An inherent need exists in furthering research in the area of the younger population and women. More importantly, practitioners and health educators need to use the existing literature and new CVD guidelines in the United States to develop informative prevention programs and strategies. Lipp et al. (1996) concluded, "Interventions must begin early in life if heart disease is to be prevented" (p. 102). Programs directed toward the effects of lifestyle behaviors on long-term health and risk for CVD are more promising for health influence (Mosca et al., 2000). Findings from this study have suggested that there is a specific need to inform and educate college students ages 18-25 and design information and education sex-specifically, while including both men and women. CVD has no geographic, gender, or socioeconomic restrictions and should be a major health concern both nationally and globally.

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Author Information
Devan R. Romero, M.S.
Division of Kinesiology and Health Science
California State University Fullerton
P. O. Box 6870
Fullerton, CA. 92834-6870

Shari McMahan, Ph.D., CHES, Professor*
Division of Kinesiology and Health Science
California State University Fullerton
P. O. Box 6870
Fullerton, CA 92834-6870
E-Mail: smcmahan@fullerton.edu

Michelle Cathorall
Division of Kinesiology and Health Science
California State University Fullerton
P. O. Box 6870
Fullerton, CA 92834-6870

* corresponding author