Heart Disease Risk Perception in College Men and Women

John S. Green, EdD, PhD; Melinda Grant, MS; Kathy L. Hill, PhD; Jeff Brizzolara, PhD, MPH; Barbara Belmont, MS

Abstract. The authors sought to assess the perception of risks for coronary heart disease (CHD) in college men and women. They surveyed 470 undergraduates from 2 major 4-year institutions who completed a questionnaire that measured perceived risks for heart disease. Sixty-eight percent of the respondents rated their risks as lower or much lower than those of their peers, indicating a clear optimistic bias. The research also revealed that the students who exercised regularly rated their risk of coronary disease lower than those who did not do so. In addition, women perceived a number of risk markers to be more potent or causative factors than men did. A significant number of participants did not comprehend commonly understood causal relationships associated with heart disease risk. The findings in this preliminary investigation suggest that college men and women do not accurately perceive their risks for developing heart disease.

Key Words: college students, heart disease, risk perceptions

Diseases of the heart and vascular system claimed almost 1 million lives in the United States in 1999, accounting for approximately 60% of the deaths from all causes. Healthcare costs related to this disease are enormous and account for expenditures that are expected to reach $329.2 billion in the near future.[1] Atherosclerotic heart disease accounts for approximately 55% of these heart and vascular diseases and thus represents a substantial portion of related mortality and healthcare expenditures. Although atherosclerosis begins early in life,[2,3] researchers have shown that appropriate lifestyle choices can substantially reduce the risk of coronary heart disease (CHD) through changes in diet and physical activity.[4,5] Although the benefits of early identification and modification of cardiac risk have been well delineated,[6,7] one must first perceive and understand the actual risks before one can act to make the appropriate choices that will result in reduction of the risks.

Research in the area of heart disease risk perception is not abundant. The existing information suggests that adults often incorrectly perceive their risk and lean toward an optimistic bias.[8–10] More recent studies indicate that risk perception may be related to individuals' perceptions of their overall general health, the number of risk factors they actually have, and whether or not they perceive themselves susceptible to diseases other than heart disease.[11,12] In all of those studies, however, adult participants were queried. We could find no studies that described heart disease risk perception in young people. Our purpose in conducting this investigation, therefore, was to describe and quantify heart disease risk perception in a cohort of college-aged men and women.

METHOD

Participants

Participants were 341 undergraduate students enrolled in physical activity classes at a large 4-year state university (student enrollment > 40,000) and 129 undergraduate students enrolled in general business classes at a midsize (student enrollment between 10,000 and 12,000) 4-year university from the same state (total N = 470). All participants from the major university were students in one of the authors' 8 physical activity classes conducted over a 2-semester period. Similarly, all participants from the smaller university were enrolled in 1 of the authors' general business classes conducted over the same time period. At the time of data collection, all of the students from the larger university, regardless of their major area of study, were required to take 4 hours of activity (sport instruction) classes. Therefore, students enrolled in these classes came from

All of the authors are with Texas institutions. ***John S. Green*** *and* ***Melinda Grant*** *are with Texas A&M University in College Station;* ***Kathy L. Hill*** *is with Sam Houston State University in Huntsville;* ***Jeff Brizzolara*** *is with the Methodist Hospital in Houston; and* ***Barbara Belmont*** *is with the Veterans Hospital in Dallas.*

diverse academic backgrounds. This method of recruitment precluded, at least to some extent, participant-selection bias toward those already physically active who, through their own interests, may have exposed themselves to a greater level of heart disease risk information than students who were not physically active. The class instructor asked students if they would complete a questionnaire regarding heart disease risk. We did not provide any reward or inducement, and participation was neither mandatory nor part of class requirements.

The sample was 45.7% male (mean age = 22.2 years) and represented both the gender and ethnic compositions of the 2 university student bodies as listed on their respective Web sites.[13,14] Although a stratified sample may have afforded more statistical power for ethnic comparisons, our sample yielded data more likely to be representative of the student composition of large and medium-sized universities. It must be remembered, however, that the sample was still one of convenience, which is considered a limitation of the study.

The combined ethnic breakdown for all students at the 2 universities where the samples were taken was 77.3% White, 7.9% Hispanic, and 4.6% African American, with 10% falling into other categories. The breakdown of the study sample was 86.1% White, 6.4% Hispanic, and 5.5% African American, with approximately 2.1% in other categories.

The institutional review board for human participants at both participating universities provided approval for the protocol, and all participants gave written informed consent to their participation in the study. We asked participants to complete a questionnaire composed of demographic inquiries and 5 questions regarding their general perceptions of heart disease risks, their exercise habits, and their family medical histories. Subsequently, they answered 40 questions in which they were asked to rate their perceptions of the strength of causality between the most recently postulated CHD risk markers and a heart attack.

We also used the 40-item "causation instrument" to assess the perception of causality between risk markers thought to be causally related. The theoretical model of CHD risk we used to construct the causation instrument was modified from a similar instrument constructed by Green and McManus[15] to include the latest conditions or behaviors thought to comprise risk factors for CHD.[16] We instructed participants to rate their perceived strength of causality for each relationship on a 10-point scale, with 10 indicating the strongest causality, and provided examples of causal relationships and associated strengths for reference. In addition, we told participants not to expect to be able to understand all of the terms or relationships described and to answer only those questions containing concepts with which they were familiar. If they did not understand a term used in the question or were unfamiliar with that particular causal relationship, they were instructed to mark an X in the rating blank as opposed to making a guess. In this way, the number of participants who did not understand a causal relationship or related terms could be quantified. Finally, we told all participants that they could view the results of their questionnaire and 1 of the authors would be available to discuss the individual's personal cardiac risk. Of the 470 participants, only 7 inquired.

TABLE 1. Self-reported Ethnicity of Sampled Participants in a Study of College Students' Perceptions of Risks for Coronary Heart Disease

Ethnic group	*N*	%
Alaskan, American Indian	2	0.43
Asian	4	.85
African American	26	5.5
White	404	86.0
Hispanic	30	6.4
Middle Eastern	2	0.43
Pacific Islander	0	0
Other or Unsure	2	0.43

We used Cronbach's alpha to conduct a reliability analysis of the 40-question causation instrument, which yielded a value of .943, indicating good reliability. To estimate content validity, 2 cardiologists and an expert holding current grant funding in the area of heart disease risk evaluated the causation instrument. All of their comments were favorable, and we implemented their suggestions for correction before we began collecting data. We analyzed all data by using the SAS statistical package (version 8.01; SAS Institute, Cary, NC). In addition, we used the chi-square statistic to compare categorical and percentage data and used *t* tests to examine differences in perception scores and analyses of variance. We set the comparison error rate at .05.

RESULTS

Participant Information and Sample Demographics

All of the participants in all classes from the 2 universities agreed to participate in the research. It should be noted that there were no significant differences ($p < .05$) in the means of any of the dependent measures related to which of the 2 schools the participants attended. Although that finding does not completely nullify the nonhomogeneity of our sample, it does suggest that pooling the participants from the different schools and the different classes presents no serious problems from the standpoint of statistical analyses.

The complete breakdown for the ethnicity of the total subject cohort can be seen in Table 1. Because a statistical analysis on groupings of 6 or fewer people would be superfluous, we confined our data analysis to the White, Hispanic, and African American respondents.

Categorical Analyses

Our primary focus was to quantify college-age students' perceptions of their own cardiovascular disease risk. To that end, we asked participants the following simple question: "Compared with those of your own age and sex, how would you rate your risk of ever having a heart attack?" As the data

in Table 2 indicate, only 25% of the participants rated their risk as average, whereas 68% rated their risk as either lower or much lower than that of their peers. This trend was not significantly different among African American, White, or Hispanic participants, $\chi^2(8, N = 470) = 10.3$, $p = .25$, or between genders, $\chi^2(4, N = 470) = 2.2$, $p = .69$.

Participants then responded to questions related to CHD risk markers defined by the American Heart Association.[1] The first question was related to physical inactivity and asked how many times per week the participants exercised for 20 minutes or more at a level that resulted in hard breathing and their heart "beating fast." Fifty percent of the participants marked the response *at least 3 times per week*, 38.8% marked *1 or 2 times per week*, and 11.2% responded with *less than 1 time per week*. Chi-square analysis indicated that the percentages were different among the 3 ethnic groups, $\chi^2(4, N = 470)$ $p < .0001$). Sixty percent of the African American participants reported that they engaged in significant exercise less than 1 time per week, whereas 54% of the White students and 57% of the Hispanic students reported exercising at least 3 times per week. Although these percentage differences reached statistical significance, the number of African American participants was relatively small compared with the number of Whites, mandating more study before any definite conclusions could be reached concerning the lack of physical activity among African American college students. Also, men reported a slightly greater exercise frequency than women did, $\chi^2(2, N = 470) = 7.0$, $p < .03$.

To quantify the risk for heart disease related to family history, we asked participants to place an X inside all boxes indicating a close relative (ie, mother, father, brother, sister, grandfather, grandmother, aunt, and uncle) who had experienced heart problems before the age of 65 years for women and 55 years for men. The findings indicated that the average number of relatives per participant with a history of early heart disease was 0.9 ± 1.0. More specifically, 36% of the participants had no relatives with heart problems, 31% had 1, 14% had 2, 3.2% had 3, 1.5% had 4, and approximately 1% had 5. Chi-square analysis showed that these percentages did not differ by race, $\chi^2(19, N = 470) = 14.3$, $p = .30$, or gender, $\chi^2(5, N = 470) = 2.4$, $p = .88$. About 14% of the participants did not respond to the question or marked *don't know*, suggesting that they had no knowledge about their family's history for CHD or simply chose not to respond.

Quantitative Analysis of Ratings and Perceived Strengths of Causation

As one might expect, those students who exercised at least 3 times per week rated their risk of having a heart attack significantly lower (mean rating of 1.8 on a 5-point scale, with 5 the greatest risk, $p < .05$) than did those who exercised 1 or 2 times per week (mean rating of 2.3), or those who exercised less than once per week (mean rating of 2.7). African Americans rated their risks higher than Hispanics did (2.8 vs 2.1, $p < .05$), but neither rating was significantly different from that of the White students.[2,3]

TABLE 2. Participants' Ratings of Their Risks for Ever Having a Heart Attack Compared with Their Peers

Risk rating	*N*	%
Much lower	141	30
Lower	177	38
Same as peers'	116	25
Higher	31	7
Much higher	5	1

An analysis of the 10-point scale items from the causation instrument showed that those who exercised less than once per week perceived diabetes as a more influential risk marker than did those who exercised 1 or 2 times per week or at least 3 times per week (6.9 vs 5.9 and 5.3, $p < .05$). Whites and Hispanics, compared with African Americans, perceived being male (4.3 and 4.6 vs 2.1, $p < .05$) and menopausal (4.2 and 5.7 vs 1.5, $p < .05$) as more potent risk markers. Our gender analysis demonstrated that women generally tended to rate some causal factors higher than men did. The variables they chose that reached statistical significance included the following causes for a heart attack: high-fat foods (7.1 vs 5.6, $p < .05$), smoking (6.3 vs 5.5, $p <. 05$), male gender (4.4 vs 3.5, $p < .05$), high levels of LDL-C (8.2 vs 7.2, $p < .05$), a family history of heart disease (6.5 vs 5.4, $p < .05$), and smoking that leads to arterial injuries (5.9 vs 4.8, $p < .05$).

When we examined the means of variables related to the CHD risk markers listed by the American Heart Association, we found that the risk of elevated cholesterol levels was perceived as the most influential (8.6), followed by hypertension (7.9), obesity (7.8), physical inactivity (6.9), smoking (6.4), family history (6.2), diabetes (5.8), and age (5.6). Obesity received the highest rating as a causal relationship. Other causes of heart attack that the respondents listed were hypertension (8.7), followed by high cholesterol (8.6), high-fat foods as leading to high cholesterol (8.3), high-fat foods leading to high LD-cholesterol (8.3), and high LDL-cholesterol causing a heart attack (8.0).

Many of the causal relationships assessed in this study involved concepts not commonly understood by those who are not involved in CHD research. As we anticipated, many of the participants found the terms difficult to comprehend. For example, 77.4% of the participants did not know that high levels of testosterone in women have been linked to hypertension and heart disease. Conversely, some of the responses revealed a lack of perception that was unexpected and somewhat disturbing (eg, 57.2% of all participants and 45.5% of the women did not understand that menopause increases a woman's risk for a heart attack). In addition, 23.8% of all participants did not recognize the link between diabetes and heart disease, and approximately 22% did not know that exercise raises high-density lipoprotein-cholesterol or that low HDL-cholesterol levels contribute to

heart disease risk. Clearly, participants lacked an understanding of some of the basic causal relationships necessary to perceive the risk of heart disease accurately.

COMMENT

One of the most important findings from our analysis of the data was that college-aged men and women underestimate their risks for heart attack, and that 68% of the respondents viewed their risk of a heart attack as lower or much lower than that of their peers. Avis and associates[8] found the corresponding percentage of adults who rate their risk to be lower or much lower than their peers was 56%. This figure, when compared with our data, demonstrates a 12-percentage-point optimistic bias. Such a youth optimism phenomenon has been documented for many other illnesses as well.[17–19] By contrast, persons with a history of health problems, especially older individuals, perceive their risk more accurately.[11,20] At this point, it should be noted that the participants' responses to the question of how they perceived their risk of "ever having a heart attack" may represent 1 of 2 things: (1) The respondents' perceived risk of having a heart attack in the short term (the next 10 to 20 years) or (2) their perceived risk of having a heart attack during their entire lifetime. Either way, we obtained a general perception of risk, and the data represent risk quantification worthy of analysis.

Our findings in the area of physical activity are comparable to those of other recent studies in that minorities and women reported fewer days per week in which they performed sufficient exercise.[21,22] However, in those studies, physical activity was measured on a Likert-type scale as opposed to our value of number of days per week exercising. Direct comparisons with our data, therefore, should be made with caution.

Given that younger people seem to underestimate their risks of CHD, we suggest it would be prudent to persuade them that altering their risky behaviors would be beneficial. A first step in this endeavor would be to improve students' perceptions of their risks. Although improvement in perception may achieve the desired results in some, it is notable that clearer perceptions do not automatically translate into improved risk behaviors.[23] Becker and Levine[9] found that even though family history of heart disease is a major risk marker, older siblings of hospitalized cardiac patients did not perceive their risk to be any higher than that of the general public, and they did not change such behaviors as smoking and being physically inactive.

In addition, Avis and colleagues[8] reported that postrisk assessment counseling did not significantly alter the perceptions of the majority of at-risk individuals. Furthermore, the few participants in Avis's study who did increase their perceptions were no more likely to change behaviors than were those whose postcounseling perceptions decreased or remained the same. In short, it seems that unless college-aged men and women respond differently from the older individuals cited in studies mentioned earlier, college and university health promotion programs are faced with a daunting task when they try to decrease the CHD risk of their students.

Although this study revealed no gender differences in the perception of overall cardiac risk in our participants, we find it noteworthy that women tended to rate the strength of causes of many of the risk markers higher than the men did. In older men and women, Reddy and colleagues[24] found no such differences regarding beliefs about the importance of these risk markers. The difference in our findings might possibly be a result of the exposure of the younger women in our sample to more contemporary media material (eg, Internet, television) concerning women's health and the fact that women's health is becoming more of a social issue, especially on college campuses. On the other hand, it may simply be attributable to women's generally more accurate perception of their health than men's.[25–27]

Another important finding was that many college students do not comprehend heart disease risk factors that have been commonly accepted. A significant number of participants did not recognize the risks that menopause, diabetes, a family history of heart disease, and dyslipidemia pose to the individual's cardiovascular health. It is tempting to speculate that our participants did not accurately perceive their heart disease risk because of the "youth optimism" syndrome mentioned earlier. This speculation would not be supported by Zonderman and colleagues,[20] who found that less than 1% of the variation in self-rated health measures could be accounted for by age. Weinstein[17] found similar results, demonstrating a correlation of only 0.1 for age and a composite measure of optimism regarding various health hazards including heart disease.

It is important to point out that our study had limitations. Although we attempted to obtain a sample that reflected "average" college students with "average" cardiac risk, we may not, in fact, have done so. Because we did not collect any physiologic data, we cannot say for sure that this subject cohort had "average" risk.

Although we tried to obtain a stratified sample that would represent students attending large and medium-sized universities, our study was preliminary and our sample was one of convenience, which has an adverse affect on its external validity. That our sample was selected from 2 schools in the southeastern portion of the United States further limits the generalizability of our conclusions.

We used a comparisonwise error rate of 0.05 in analyzing the data and made many comparisons at this level of significance. It is possible that a type I error occurred in our analysis; however, in studies with many comparisons, it is almost impossible to analyze data without taking this risk. Despite these limitations, however, we suggest that our data support the following 2 preliminary conclusions:

1. College men and women are optimistically biased about their overall heart disease risk.
2. College men and women do not accurately perceive or are unaware of a significant number of commonly known risk markers for heart disease.

More research into this area is needed to develop means to improve young people's perception of their risks for CHD and to encourage them to act on their enhanced perception and thereby reduce overall heart disease morbidity and mortality.

NOTE

For comments and further information, please address all correspondence to John S. Green, EdD, PhD, Mailstop 4243, Netum Steed Physiology Research Lab, Room 113,Texas A&M University, College Station, TX 77843. (e-mail: jsgreen@tamu.edu).

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