

Student Perspectives on Cardiovascular Disease Risk

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Abstract

Cardiovascular disease is the leading cause of death in America today despite being an entirely preventable disease. This is largely due to the Western diet and lifestyle that has spread to wealthy nations across the world. Many of the behavioral factors that lead to cardiovascular disease begin early in life and accumulate over time, and although it is possible to change these habits many people do not consider doing so until it is too late. If public health officials could successfully educate the public on how to improve their habits, that alone would directly prevent certain non-communicable diseases such as cardiovascular disease as well as indirectly improve healthcare costs, the economy, and poverty. Since college students in particular are notorious for their poor diets, physical inactivity, and lack of sleep and stress management, this literature review will investigate the discrepancy between college students' perceived risk of developing cardiovascular disease in the future, versus their actual risk based upon the behavioral risk factors they engage in today, and the effects of select demographics. The findings will be critically examined and any gaps in knowledge will be discussed along with potential solutions based on public health educational models and past areas of success.

Introduction

Cardiovascular disease is the leading cause of death in America today, despite being a largely preventable disease. Although communicable diseases have been the predominant causes of death for much of human history, it is non-communicable diseases that now form the most common health concerns for Americans (Centers for Disease Control and Prevention (CDC), 2017). While this shift in incidence has been partially due to the decline in infectious diseases as a result of better sanitation practices, vaccinations, and the development of antibiotics, the proliferation of chronic conditions would never have been as great if not for the so called “Western” diet (Cordain, 2005).

Conditions that arise from malnutrition such as obesity, diabetes, and cardiovascular disease are present all over the world, but they tend to be most prevalent within wealthy, developed nations. Oftentimes, as developing nations grow wealthier they tend to adopt some of the customs typically found in Western cultures; including the type of diet that Westerners eat. The Western cuisine is typically characterized by high intakes of red and processed meats, high-fat dairy products, refined sugar and grains, and an excess of salt and fried foods, often in replacement of fruits and vegetables, lean proteins, and fiber. These particular foods are problematic because they serve to increase an individual’s blood sugar and cholesterol, while simultaneously depriving them of essential nutrients (Cordain, 2005).

For instance, as American fast food chains multiplied across Asia, so did nutrition related ailments rarely seen there ever before. Between 1990 and 2006 the number of McDonald’s locations in China grew one thousand-fold. As a result, the Singapore Chinese Health Study found that Chinese citizens who regularly consumed these foods had increased their risk of developing diabetes and cardiovascular disease by as much as 27% and 56%, respectively.

Likewise, soft drink sales in India rose by 12.6% each year from 1997 to 2007, and today their incidence of diabetes is expected to increase from 61 million to 101 million by 2030 (Pan, 2012). Given that the traditional dietary patterns of these countries consist mainly of vegetables and very few animal products, it is clear that the infiltration of the Western diet has had an exceptionally large impact on the health of these nations.

In September 2000, the first United Nations Millennium Development Goal was written with the objective of eradicating extreme hunger and poverty from the world (World Health Organization (WHO) n.d.b). As world leaders move towards achieving this goal, it is likely that more nations will adopt Western diets just like China and India, and that these countries' overall health will worsen due to chronic diseases and conditions. While it is certainly desirable for developing nations to gain more wealth and access to food, this pattern suggests that prosperity may come with a price.

Not only has the Western diet affected the food that people eat, but it has also infiltrated the culture by fostering common misconceptions and creating harmful behavioral norms, such as widespread complacency with the current prevalence of disease. These norms are further perpetuated from one generation to the next through insufficient education at the grade school level. As a result, many Americans today do not seem to know or care about the link between lifestyle and preventable diseases.

It is commonly accepted among many that certain conditions such as cancer, cardiovascular disease, obesity, and diabetes are simple facts of life that come with old age; despite research showing that this is not necessarily the case (WHO, n.d.a). For example, the most common types of cardiovascular disease include coronary artery disease - which is the blockage of an artery that supplies blood to the heart, usually caused by atherosclerosis

(hardening of the arteries) - high blood pressure/hypertension, cardiac arrest/heart attack, congestive heart failure - which is a weakness in the heart allowing for the buildup of fluids in the lungs - and stroke. All of which are entirely preventable diseases, but many of the behavioral factors that lead to these chronic diseases begin early in life and accumulate over time. Although it is possible to change these habits fairly easily, many people do not consider doing so until it is too late. This is most clearly evidenced by the fact that 46% of all deaths in 2014 were due to cardiovascular disease and cancer alone (CDC, 2017).

Like other lifestyle related non-communicable diseases, cardiovascular disease is not going to be cured easily because of these behavioral links and mistaken beliefs. Therefore, it is imperative for scientists to conduct research into changing these behaviors at a societal level through effective public health education.

In general, there is a large focus on lifestyle factors within the field of public health because a prevention heavy approach is one of the best ways to prevent numerous health conditions. Aside from the detriment that the Western lifestyle implements on one's health, it is also an unsustainable practice for the environment and continues to wreak havoc on the economy through skyrocketing healthcare costs (CDC, 2017). If public health officials could successfully influence the public to improve their personal health habits, that alone would directly prevent multiple chronic diseases as well as indirectly improve healthcare costs, the economy, poverty, and the environment. Furthermore, by lessening the impact of a few specific preventable diseases, scientists would also have the ability to dedicate more resources to other serious diseases that do not have behavioral causes.

The costs of chronic diseases and conditions currently account for 86% of the \$2.7 trillion spent on healthcare by the United States every year. \$316.1 billion of those funds are

spent treating cardiovascular disease alone (CDC, 2017). By contrast, a study completed by Trust for America's Health found that by investing as little as \$10 per person into preventive health programs provided savings of up to \$16 billion within five years (Trust for America's Health, 2008).

Preventive efforts are often ignored because they can cost a lot of money up front but the reality is that they often end up costing far less than treating the diseases medically. This is because lessening the incidence of cardiovascular disease would not just alleviate immediate healthcare expenditures. Estimates suggest that preventing lost productivity due to cardiovascular disease would add approximately \$1,100 back into the economy for each employee who would have been afflicted (Iluxon, 2017).

Besides the effects on healthcare and related productivity losses, preventing cardiovascular disease would serve to improve other areas of society as well. For example, chronic diseases such as cardiovascular disease tend to disproportionately affect those living in poverty (WHO, n.d.). A decrease in its incidence would not only diminish healthcare costs for those individuals, but would allow them to generate more income since they would not have to take off as much time from work.

Similarly, a reduction in cardiovascular disease and related diseases due to an increase in healthier behaviors would serve to benefit the environment. As people make healthier choices such as driving less and biking more, eating more vegetables, and not smoking, the effects not only directly benefit themselves but the surrounding environment as well.

As a result of the impacts of the Western diet, cardiovascular disease and its related effects have become far too prevalent in society today. Researchers in the field of public health already know that cardiovascular disease is caused largely by lifestyle choices and that the

impacts of these choices add up over many years. But given that this information is already common knowledge, it is surprising to know that so many people are not making changes to avoid the risk in the first place. It is likely because many people underestimate the long term effects of their daily behaviors, much like how people in the early twentieth century underestimated the effects of smoking tobacco on cancer. Thus, rather than focusing their efforts on treating the disease itself, it would be much more beneficial if researchers could learn exactly which areas of cardiovascular health people do not quite understand. Finding the answer to this question could help public health officials to form better educational programs and influence policies that actually change American behavior.

In order to research this question, it is necessary to determine at which point people begin underestimating the impacts of their behavioral risk factors. Although obesity and related conditions are becoming more of a problem in young children, it is generally possible for youth to make poorer choices with fewer consequences than adults. For example, since it is possible for children to lose weight with less effort, the impacts of their weight are not as significant as in those who are older (Epstein, 1995). On the contrary, if adults wait too long before making changes to combat poor health, the internal damage from years of neglect is likely irreversible. In some cases, studies have found that years of obesity can damage the heart such that even with dramatic weight loss, previous heart function is never regained (AlGhatrif, 2013). Therefore, the most likely point at which behaviors start to become impactful, yet still easily reversible, would be around the beginning of young adulthood, or in college students.

College students in particular occupy a unique position in life due to the combination of their age along with their strenuous academic circumstances. These two factors together often lead to many students' infamous reputations for bad eating, physical inactivity, lack of sleep, and

poor stress management. But this lack of understanding is likely not only due to the pervasive Western culture that these students have been immersed in; it is also the result of years of inadequate health education. If college students were to be educated well enough to be able to accurately attribute the state of their cardiovascular health in the future to the impacts of their habits today to it would be much easier to convince them to change. Thus, cardiovascular disease would be prevented from happening in the first place.

This research investigates the discrepancy between college students' perceived risk of developing cardiovascular disease in the future versus their actual risk based upon the specific, quantifiable risk factors that they reportedly engage in today. The data examined in this study shows that students do not in fact fully understand the impacts of the risks they are participating in today. It also shows the areas in which students are missing fundamental knowledge of cardiovascular disease, and where they can improve through personal care along with public health education.

Such findings imply that current education regarding cardiovascular disease is inadequate and needs to be addressed. Finding the exact levels of college students' cardiovascular disease knowledge would allow public health education to be more effective and readily implemented. Furthermore, the way in which college students' circumstances combine makes them the perfect subjects for public health studies concerned with lifestyle choices and risk perceptions. Exploring data from students at various colleges will demonstrate the importance of this issue as well as the need for continuing research in this area. The study should also elucidate some specific areas in which colleges can improve their educational efforts, which could then be extrapolated to grade schools or other organizations for their use.

The ultimate purpose of this paper is to first and foremost improve the lives of others through preventive public health efforts. By gaining the knowledge necessary to allow for a more targeted focus on behavioral changes, advances in societal health will be enacted that can reverse the impacts of the modern day obesity epidemic and all of its related ailments – cardiovascular disease included.

Review of Literature

The broad goal of this study is to ascertain the exact level of college students' misconceptions regarding their future risk of heart disease, and where educational efforts can be improved so as to initiate the greatest societal impact. Although the research into these risk perceptions is in its infancy, the studies that do exist confirm that students generally do not have accurate perceptions; albeit some are much worse at making predictions than others. This much is evident due to the results of studies concerning cardiovascular diseases, related unhealthy behaviors, and even the effects of certain demographic factors on risk. But what the research really highlights is that scientists are only just beginning to understand how much college students do not know, and how the confounding factors that affect what limited knowledge they have make it difficult to implement changes anyway.

Why College Students Engage in Unhealthy Behaviors

As a demographic, college students are typically at a higher risk of engaging in certain unhealthy behaviors as a result of their place in life combined with some of the distinct circumstances present in the academic environment. As noted above, there are numerous risk factors associated with the eventual development of coronary heart disease or other cardiovascular diseases, but most studies have not focused on the specific reasons why college students engage in these unhealthy behaviors to begin with. In addition to the lack of basic

education regarding cardiovascular disease and other chronic diseases, it is likely that the general atmosphere of college is a large factor in contributing to the development and proliferation of these behaviors.

For example, the strenuous academic requirements of college often cause many students to experience high levels of stress for long periods of time. As a result, students are that much more likely to begin cultivating other risk factors for heart disease, such as high blood pressure, sooner than they would have if they were not as stressed. This high stress also leads to other synergistically interactive behaviors, such as sleep deprivation. Lack of sleep is also greatly advanced by an abundance of assignments and commitments that students must complete. These commitments also push students towards having less time to spend working out or cooking healthy meals.

The lack of time necessary to cook healthy meals often leads to a pattern of eating at the campus provided dining locations. While these dining halls are certainly convenient, they often do not provide a large enough of a variety of healthy options to choose from. Thus, students end up being very limited in the food choices they can make, even if they do desire to take care of their health. Furthermore, for those campuses that are located in “college towns,” the local restaurants and bars only further contribute to the pressures of convenience and unhealthy options.

Moreover, the unique social dynamics of college life provide plenty of easy opportunities for unhealthy decision making. Binge drinking, smoking, and the use of illicit drugs are far too common amongst college students, even for those who would normally never engage in those activities before or after their time in higher education.

To expand on this idea of social pressures, there is also wide speculation that college social groups have an effect on individual students' decisions to engage in unhealthy, and at times even dangerous, behaviors. For example, researchers in 2008 attempted to determine whether or not involvement in Greek life put students at a higher risk of engaging in chronic disease risk factors. The study, which consisted of 1,595 students - 265 Greek members and 1,330 non-Greek members - was conducted at a college where approximately 20% of the population participated in Greek life in order to determine if there was any effect on other unhealthy behaviors aside from excess alcohol consumption (Scott-Sheldon, 2008).

The results from the study showed that Greek life did in fact have an impact on students' behaviors, by encouraging a number of ill-advised decisions such as smoking tobacco, excessive alcohol consumption, illicit drug use, and various types of risky sexual behaviors. The effects were then broken down and discovered to be even more pronounced between certain fraternity and sorority members. For example, the women in sororities were found to be more frequent smokers than non-sorority members, but there was no great correlation between smoking and fraternity men (Scott-Sheldon, 2008).

It is likely that the living arrangements associated with Greek life were also an important component of these students' unhealthy behaviors. Along with the unspoken pressures affiliated with fitting into a particular social network, the greater autonomy and lack of parental supervision afforded to those living in off-campus Greek housing provide yet another environment conducive to risk-taking and generally unhealthy behaviors (Scott-Sheldon, 2008).

However, the results of this study are limited in the sense that it was conducted as a cross-sectional design that involved self-reported behaviors (Scott-Sheldon, 2008). Therefore, while the findings are certainly informative, they are not necessarily applicable to all institutions

of higher learning. Rather, the insights that were discovered should be used to extend common knowledge regarding college student health behaviors, and inform college administrators and health staff as to how they may better target certain groups on campus.

Despite the fact that the effects of the college environment are already visible and that most students are actually aware of them, there are still a lot of misconceptions regarding how quickly these seemingly innocuous aspects can impact one's overall health. The speed of such impacts is especially prevalent because it is well known that college students frequently engage in the types of behaviors that are well established as risks for the future development of cardiovascular disease.

Risk Factors Influenced by Unhealthy Behaviors

The effects of the collegiate environment have been repeatedly confirmed through surveys in which students admittedly report engaging in unhealthy behaviors. In particular, students tend to note trouble with proper nutrition and exercise along with struggles in time management – leading to chronic sleep deprivation and an overwhelming amount of stress. These behaviors end up leading to the risk factors that can eventually cause serious health problems, including cardiovascular disease. While there are many direct and indirect risk factors implicated in the eventual development of cardiovascular disease, this research has uncovered that there are several somewhat unique to college students that are not frequently addressed, despite potentially being some of the most important.

Two of the most basic, yet telling indicators of future heart health are the statuses of an individual's blood pressure and cholesterol levels. But college students are not always aware of their own levels because they do not always know that it is necessary to begin those screenings.

A study from the American Journal of College Health focused primarily on the blood pressure and cholesterol levels of college students in order to analyze this precise issue. A total of 226 students were examined for serum cholesterol, blood pressure, and self-reported levels of health, and it was found that 29% had higher than desirable cholesterol levels, 10% actually had high cholesterol, 15% to 21% had borderline blood pressure levels, and about 10% to 11% had fully developed systolic or diastolic high blood pressure, respectively (Spencer, 2002).

The self-reported survey administered to 226 students between the ages of 18 and 26 showed that most of their elevated levels were largely due to smoking, binge drinking, lack of aerobic physical activity, elevated stress levels, and diets high in saturated fat. Over half of all students also noted having family members either living with or currently at risk of developing high cholesterol or blood pressure in the near future (Spencer, 2002).

Despite presenting with arguably high levels of cholesterol and blood pressure relative to their youth, many students are simply unaware that they should be receiving preventive blood screenings in the first place. Current medical literature recommends screenings to begin at the age of 20, to be followed up on at least once every 5 years, but this knowledge is not necessarily widespread due to the common misunderstanding that young adults do not suffer from cholesterol problems (Spencer, 2002).

In addition to the state of vascular health, the amount of sugar that students regularly consume is also largely overlooked. While saturated and trans fats are usually accounted for in various cardiovascular studies, there are growing bodies of research suggesting that sugar is an even greater driver of chronic diseases than fats.

A study that looked specifically at the intake of sugar and its impact on chronic disease development in college students found that on average, 24% of students' kilocalories per day

came from sugars, 17% of which were specifically from added sugars. Their regular diets included the consumption of approximately 1.1 sugary beverages every day, far above the recommended sugar intake of 5% daily kilocalories. In fact, approximately 40% of the students who participated in the study admitted to consuming over twice as much sugar as the recommended amount. As a result, many students were found to be prone to higher levels of low-density lipoprotein cholesterol, lower levels of high-density lipoprotein cholesterol, and higher blood glucose (Hirshberg, 2011).

These changes in blood levels are significant due to their potential for long lasting effects on students' health. Not only do the direct impacts of blood level changes increase students' future risk of heart disease, but research shows that those who consume excess sugar have persistent trouble in managing their appetites. In particular, fructose-sweetened beverages have been shown to render appetite suppressing hormones ineffectual, thus increasing the likelihood of people to gain weight even more by creating a vicious cycle of undesired weight gain and disease proliferation (Hirshberg, 2011).

While the results of this study are limited in that it was conducted as a cross-sectional study at a university where the students were known to regularly consume less sugar than the average college student, the fact remains that young adults are six times more likely to gain weight than at any other time in life. Thus any added difficulty in maintaining weight provides only further proof of the need for preventive education - especially regarding seemingly obscure health topics, such as sugar consumption (Hirshberg, 2011).

Lastly, another largely ignored factor of cardiovascular health is sleep – both in its duration and quality. Since college students are notorious for not attaining sufficient amounts of

sleep, it is important to study whether or not sleep is a determining factor in developing heart disease.

A study looked at factors such as inconsistent sleep duration, sleep complaints, frequent napping, and snoring to see if any of these aspects were correlated with increased risks of coronary heart disease, or if it could be attributed only to individual personality characteristics. Specifically, the researchers observed factors of sleep alongside traits that were described as being components of a typical “Type A” personality type. Such a study is important because previously there had never been any research on this topic that delineated between the effects of sleep and personality on heart health (van Diest, 1990).

It was found that these sleep factors did indeed suggest a higher risk of developing coronary heart disease, due to their association with vital exhaustion. Those who experienced exhaustion accordingly noted continuous sleep problems, such as difficulties staying asleep for long stretches through the night along with large increases in the time spent napping during the day. On the other hand, the differences in student personalities could only be attributed to frequent waking during the night (van Diest, 1990). Therefore, the effects of inadequate sleep can be definitively added to the determinants of cardiovascular disease, and sleep should likewise be included as an important component of college heart health discussions.

It is important to study the lesser known risk factors of disease because whether or not students are aware of it, these risk factors are already having some serious effects on their health. If students are only taught to pay attention to the more well-known causes of heart disease, such as smoking tobacco or eating fatty foods, then they may miss some of the most important factors that are already affecting them because they are not aware of the seriousness of their actions.

Results of Risk Factors

It is not only evident that students are at risk because of various behavioral factors, but because some of them are already beginning to display the signs of cardiovascular disease itself. Due to the numerous studies regarding various risk factors, it is well established that many college students are at risk of heart disease due to their reported behaviors. But aside from the research into students' current lifestyles, there are also multiple studies showing that the effects of those risks are already taking hold.

For example, one study focused on cardiovascular disease risk in college students by assessing their current body mass indices (BMIs) and weights. These measures are relevant to a number of chronic diseases, as they are positively associated with unhealthy lifestyle factors along with abnormal levels of blood pressure, dyslipidemia, blood glucose, and arterial stiffening (Hlaing, 2007).

Out of the 487 college students that were tested, 28.11% were considered to be medically overweight or obese. In addition, significant differences were found among students of different ethnic groups - namely, it was discovered that 34.06% of Hispanic students and 42.03% of Black, non-Hispanic students were overweight, compared to only 23.91% of their White, non-Hispanic peers (Hlaing, 2007).

The results from this study were considered to be fairly representative of college students everywhere, because the percentages of students participating in the study from each ethnic group accurately matched the percentages of students present at the university. However, this does not necessarily mean that these exact results would be representative of college students at all universities (Hlaing, 2007). But given the relative consistency of overweight patterns among various ethnic groups, it would be important for college administrators and health staff to

incorporate different demographic measures into any research that is conducted, as well as any college-wide programs.

To further the proof that these behaviors are already having effects, another study was conducted to determine the prevalence of metabolic syndrome in college students. Metabolic syndrome is a cluster of conditions that increase the risk of heart disease, stroke, and diabetes through high blood pressure, high blood sugar, high waist circumference, and high cholesterol. The syndrome is dangerous because possession of more than one of any of these factors synergistically increases one's chances of developing a related chronic disease, such as diabetes mellitus or cardiovascular disease (Morrell, 2012).

In order to test for metabolic syndrome, anthropometric, biochemical, clinical, and dietary data were collected from over 2,000 students over the course of three years. These data were used to ascertain the students' BMIs, dietary levels of saturated fat, magnesium, fiber, and amount of physical activity. It was detected that only 9.9% of the men and 3.0% of the women had already developed full metabolic syndrome, but 77% of the men and 54% of the women had at least one trait of the disease. For example, approximately half of all of the men were determined to have BMIs that rendered them overweight or obese, as did more than 25% of all the women (Morrell, 2012).

These results indicate that many students are already at risk of developing a number of chronic diseases, including cardiovascular disease, sooner than they may realize. In particular, the high percentages of overweight and obese students are at a greater risk of developing future confounding factors of metabolic syndrome, even if they did not possess those factors at the time of the study. These results are also especially relevant given that the students' weight gains were

likely due their reported insufficient levels of nutrient intake, which will only further serve to increase their risk of heart disease in the future (Morrell, 2012).

Finally, a study conducted to determine if cardiovascular disease itself was present in people as young as college students further exemplifies the need for action. 203 college men and women were brought in and studied for various attributes, such as height, weight, waist circumference, blood pressure, blood lipids, and cardiorespiratory fitness. They were also surveyed as to their exercise habits and demographic information. While it was found that 34% of the study population had no risk factors for cardiovascular disease, a full 28% had at least one risk factor for cardiovascular disease, 22.7% had two risk factors, and 14.8% had three or more risk factors (Schilter, 2010).

Although the results may not seem particularly high, the fact remains that all of these students are at risk of heart problems. But the greater problem lies in how many of them are unaware of their risk factors. Most students are unable to successfully predict which lifestyle factors they engage in today will predict the state of their health in the future – a fact which is further complicated when students are unaware of the differences in risk factors between themselves. In this study, it was determined that the female participants were more likely to be suffering from impaired glucose tolerance, whereas the males were unable to recognize their hypertension or elevated triglycerides. However, it remains yet to be determined which risk factors pose the greatest potential effects on heart health overall (Schilter, 2010).

In the meantime, it is wise for students to simply try to avoid developing any and all risk factors so as to provide the greatest amount of protection. Unfortunately, what students are not aware of, cannot possibly be changed. While the results of this study are important for generating a knowledge base regarding the current state of the average college student's health, it

is important to ensure generalizability of the results so as to best improve outcomes for future students (Schilter, 2010).

Thus, research has shown that risk factors for heart disease can even begin developing at a college age. These findings set the stage for more research concerning why students allow these risk factors to develop in the first place; because the real danger of any health-related risk factor lies in the fact that most people are not even aware of its presence.

Inaccurate Risk Assessments

Despite the seemingly obvious nature of the college environment and its associated risks, combined with the visible early warning signs of cardiovascular disease, research has shown that most students cannot, in fact, accurately predict their own risk levels. Studies conducted thus far have concluded that when compared to assessments of students' actual likelihood of future heart disease development, the vast majority of college students possess remarkably inaccurate perceptions regarding their future risk.

According to a study conducted in 2003, the majority of college students, when surveyed, could not accurately determine their own personal risk levels of cardiovascular disease. The examination asked them specifically about their perceptions of developing coronary heart disease, to which 68% of the students responded that their risks - specifically for heart attacks - were much lower than they actually were. A full 56% were also under the impression that they were each at a lower risk than the rest of their peers. Contrarily, their ability to predict risk of future heart disease was positively correlated with the accurate perception of risk development for other chronic diseases, cardiovascular risk factors, and overall general health (Green, 2003).

This research was conducted on a general population of undergraduate students from two major universities, where it was found that although over two-thirds of the students

underestimated their risks, the misconceptions were slightly more accurate among women and those who exercised regularly. Other studies have found similar accuracy in perceptions among those who already possessed a medical history with at least one chronic disease (Green, 2003).

By contrast, students with family histories of cardiovascular health problems did not have significantly more accurate predictions of their own future health. Nor did they report such influences having any effect on their personal health behaviors, even among those with siblings who had been recently hospitalized due to cardiac events (Green, 2003).

As with other studies conducted on student risk perception, this research was completed as a convenience sample of the students attending a medium-sized university. While the results are promising, they are preliminary, and may not necessarily be representative of truly “average” students with “average” cardiac risks (Green, 2003).

However, similar assessments written with the inclusion of more demographic factors have not found any other significant demographic correlations aside from those attributed to biological sex. Student type, college major, age, and gender did not have any discernible effect on their attitudes towards cardiovascular disease risk perception (McFall, 2009).

Similarly, other research into this field of study has confirmed these analyses, even when those screened are more highly educated on the risk factors of cardiovascular disease. A cross-sectional, descriptive, convenience study administered by a doctoral student in the Midwest found that graduate students with specific knowledge about the disease had a much more realistic view of their own health risks than the average undergraduate student (Tran, 2017).

Out of the 158 participants in the study, it was found that although the graduate students had useful knowledge about heart disease, they did not necessarily apply the risks to their own thirty year risk estimates. Most students in this population of highly educated individuals still

underestimated their exact level of risk, despite 50% of them presenting with at least one risk factor for cardiovascular disease (Tran, 2017).

Even studies focused entirely on nursing and pre-medical students found comparable results. Overall, health care students were found to have especially positive outlooks regarding their risks of cardiovascular disease, but these outlooks were not necessarily warranted given their reported behavioral responses. It is clear that these students' exposure to cardiovascular specific education did not have a discernable effect on their decisions to engage in healthier behaviors. They were also unlikely to rate their abilities to counsel patients on heart health as sufficient despite receiving heart specific education (McFall, 2009).

Current research has clearly exemplified that college students are already at risk of developing heart disease risk factors, and even the beginnings of heart disease itself. But there are still great misconceptions about what students know, and how what little they know is impacting their overall risk.

The most alarming takeaway from these studies was that aside from the general lack of awareness regarding their own risks, a number of students from the general population did not at all understand the correlations between their lifestyle factors and their risk of coronary heart disease in the first place. This misconception applied to a number of widely accepted common factors of cardiovascular disease risk, such as diabetes, family history of heart disease, and unhealthy cholesterol levels (Green, 2003). This lack of awareness concerning personal risk, along with general heart health knowledge, demonstrates a growing need for more comprehensive public health prevention efforts in America.

Why Students Misunderstand

Public health researchers have sufficiently established that the level of college students' misconceptions regarding their heart disease risk are real, rather high, and relevant as predicted by current cardiovascular disease rates. But given the lack of interventions that have been implemented thus far, public health practitioners are clearly still contemplating as to what can be done to successfully ameliorate these eventual effects.

Provided the current level of college students' awareness and the specific gaps in knowledge that many of them possess, it is likely that the best course of action for intervention would be to enhance efforts before students reach college age. But in order to better educate students about harmful behaviors and heart disease risk factors, it is first necessary to determine exactly where these gaps in risk perception knowledge lie.

Preliminary research conducted into college student heart disease risk perception has certainly been able to pinpoint the severity of the problem, as evidenced by cardiovascular and metabolic disease rates, as well as some specific causes of student risks and behaviors. But as far as heart disease knowledge bases are concerned, there were still several unanticipated findings within the research.

For example, the general lack of knowledge that many college students had regarding basic information about heart disease was fairly surprising. Some studies suggested that a number of students were not necessarily aware that heart disease was the number one cause of death in America today – rather they believed that cancer deaths surpassed those of heart disease, especially for women. In addition, there were many who were ignorant to the knowledge that socioeconomic status and race had anything to do with cardiovascular disease incidence on a national scale.

Although it is plausible that the students understood the severity of heart disease, just not that it was specifically the number one cause of death, the fact remains that they were not adequately educated as to the real prevalence of cardiovascular disease. As a result, the students were still unable to predict their own risks because they did not have practical knowledge on hand. Such a lack of knowledge not only implies potential for the development of heart disease, but also any other disease for which they are deficient in education.

One of the most likely causes of this lack of knowledge is that other diseases are taught about in greater depth when children are young. Conditions like alcoholism, substance use and abuse, safe sex and sexually transmitted infections, and even mental health issues are covered in much greater depth in grade school health classes, despite the fact that none of them are as prevalent or as deadly as cardiovascular disease.

Ideally, it would be possible to educate more children about chronic diseases at younger ages. However, it is probably more reasonable to begin education into these topics at the collegiate level in order to garner better reception. College students may be better able to fully appreciate the risks of unhealthy behaviors because of their age and relative interest due to the immediate relevance of heart disease risk factors to their current life circumstances. Furthermore, compared to young children who are still mainly under the influence of their parents, college students who are provided with the proper information needed to make educated decisions would have more autonomy to effectively re-organize their time and locate resources to maintain healthy lifestyles.

In consideration of all the research that has already been done, it is likely that college students from most universities around the country would demonstrate the same broad gaps in heart disease knowledge like those in the aforementioned studies. Through careful analysis, it is

important for researchers to illuminate exactly what these students may not know about their own heart disease risks, as well as the areas in which their general knowledge of the disease is the most lacking. Such findings would hopefully provide a starting point for educators at various colleges to begin improving heart health knowledge. Completing this type of research would not only achieve the goal of improving college public health, but would also add to the existing literature on some of the effective methods of public health prevention efforts for students in general.

Potential Methods of Intervention

It is imperative for researchers to study which types of educational interventions are best at addressing public gaps in knowledge and how they can best be implemented so as to affect better health outcomes for future generations.

Considering that most college students likely resemble those who have already been studied, in that they have access to the same types of convenience factors such as dining halls and college towns, it is likely that most college students are already prone to having multiple unhealthy habits. In addition, all environments of higher education are alike in terms of the excess stress, sleep deprivation, and other causes of risk factors and unhealthy decision-making unique to college students. Despite the few improvements that have already been made to ameliorate these problems, there are always areas in which public health prevention efforts can be improved.

For example, some colleges have already made strides in the past few decades to provide healthier meal options, large fitness centers with free classes and cheap trainers, and affordable access to mental health professionals to help students process their stress. But despite these healthy changes, all colleges could continue do more by implementing more health education

programs through on campus departments. Perhaps programs regarding heart disease or other chronic conditions could be modeled after the alcohol awareness workshops that many colleges already administer to incoming freshmen every year. Like alcohol awareness education, unique programs designed to teach people a bit about certain risky health behaviors relevant specifically to cardiovascular disease could feasibly be administered. If created in conjunction with established public health models and health education standards, such programs could prove to be very effective while still maintaining low costs.

Conclusion

There have been a number of different studies used to identify the behaviors, risk factors, characteristics, and future implications of students' cardiovascular health based upon the state of their health today. Although the research into this niche field of study remains introductory and largely exploratory, there is already enough conclusive evidence available to definitively suggest that college students do not have accurate perceptions regarding their future cardiovascular disease risk.

This collective finding not only provides legitimacy to the efforts of public health professionals who work to prevent heart disease before it starts, but also show conclusively how serious the problem is for people as young as college students. It also promotes an excellent starting point for future studies regarding proper intervention methods, as well as valid and reliable survey tools for future public health researchers to draw from when collecting more data on students' behaviors and risk factors.

Although the studies discussed in this research were overall very well conducted, there were some instances in which the particular demographics of the study populations were somewhat limited in the scope of their ability to describe college students everywhere, as

mentioned above. However, given the overwhelming consensus across the vast majority of the concepts discussed, it is plausible that students from most universities would show comparable results, albeit not necessarily at the exact same percentages.

That is to say, it would be reasonable to expect future studies to coincide with existing research in that the vast majority of college students will most likely not know how great their risks of cardiovascular disease really are – the only possible difference being how well they can estimate their risks compared to the participants in other studies.

In order to account for these individual differences in behavior, the implications of this study should lead to further studies conducted with larger samples of college students, divided along different demographic measures – such as academic fields of study, year in school, race or ethnicity, gender or sex, or any other potentially divisive measures. The results of obtaining more knowledge of college students' behaviors, and the effects of relevant outside factors, would then lead to better preventive programs and education.

Future research should also expand upon the aforementioned gaps in knowledge so public health practitioners can know how to best educate future generations. Scientists should aim to look more specifically into the students' specific inconsistencies about cardiovascular health knowledge – both in terms of their own personal risks as well as general knowledge about the disease. Researchers should also study which types of educational interventions are best at addressing these gaps in knowledge and how they can best be implemented to effect change before the effects of heart disease risk factors take hold.

Regardless of the exact results of future studies, there will most likely always be room for improvement concerning better public health education. The only real differences to be illuminated by further study are how much, and in what capacity. As research continues, the

results should help contribute to the existing literature on these problems by uncovering potential solutions that lead to new preventive health efforts for cardiovascular disease, not just for students, but for people everywhere who are interested in maintaining optimal cardiovascular health.

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