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Navigating Risk:

Understanding Chronic Disease Factors in Delaware's College Population

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Abstract

This study aimed to assess the prevalence of chronic disease risk factors among college students, particularly within a minority-serving institution in Delaware, to inform targeted prevention efforts. A quantitative cross-sectional research design was employed, administering surveys to 457 students at Delaware State University over a three-year period. Surveys assessed tobacco use, physical activity, and dietary habits. Descriptive statistics were used to analyze the data. The majority of respondents were people of color (83%) and female (74%). Significant findings included 24.1% reporting trying tobacco cigarettes, 4.9% smoking in the last 30 days, and 37.2% trying e-cigarettes, with 11.8% vaping in the last month. Regarding physical activity, 65.6% reported being active for 120+ minutes per week, while only 5.7% consumed four or more servings of vegetables daily. Behavioral disparities were observed, with more males reporting tobacco use but also higher engagement in physical activity compared to females. Nutritional intake was inadequate for both genders. Convenience sampling may limit generalizability, highlighting the need for larger, randomized studies. Colleges are pivotal settings for promoting healthy behaviors and addressing chronic disease burdens. Integrated approaches involving education, policy changes, and community engagement are crucial. Investing in health promotion programs is essential for cultivating a healthier future population. This study underscores the importance of preventive measures and equitable access to resources for addressing chronic disease risk factors among college students.

Introduction

In the United States, eight out of the 10 leading causes of death are related to chronic disease.[1] Americans are recording at least one chronic health condition, with one in four adults diagnosed with multiple chronic health conditions.[1,2] In 2021, Delaware mirrored this United States data with the top two causes of death reported as heart disease and cancer.[3] Minority populations, including racial and ethnic minorities, often face disparities in the risk of chronic diseases compared to the general population. For example, Black Delawareans have a higher prevalence of diabetes (17.5%) than white Delawareans (11.8%), with their death rate from diabetes more than twice that of their white counterparts.[4] These disparities partly result from a broad range of dimensions, such as the social determinants of health and cultural and behavioral influences. Long-term health conditions that impact quality and quantity of life can be traced back to an abbreviated list of risk factors, including tobacco use, physical inactivity, and poor diet, the last two strongly associated with obesity. Risk factors developing into chronic diseases typically

involve a complex interplay of various influences over time. College-aged students face many adverse conditions linked to chronic diseases, such as lifestyle, environment, and socioeconomic factors. Peer pressure, social norms, and cultural influences can contribute to unhealthy behaviors such as smoking, sedentary lifestyles, and poor dietary choices. Research has shown these unhealthy behaviors typically persist into adulthood; therefore, effective programs focusing on chronic disease prevention in young adults are needed.[5] Currently, one in three young adults attend college in the U.S., making the college setting an optimal location and opportunity for health promotion during a critical stage of development.[6] Behaviors such as smoking provide a significant risk factor for chronic diseases among college students and can have serious long-term health consequences, such as cardiovascular disease, respiratory conditions, and cancer. Physical inactivity, often due to long hours of studying or sitting in classes, increases the risk of obesity, heart disease, and other metabolic disorders. Poor nutrition habits, such as excessive intake of fast food, sugary beverages, and processed snacks, can contribute to chronic diseases like obesity, diabetes, and cardiovascular issues.[6,7] Addressing these risk factors to reduce the disease burden requires a comprehensive approach involving education, promoting healthy lifestyles, biometric screening assessments, and creating supportive environments within college communities. We must also consider racial disparities to equitably address the chronic disease burden. This study was designed to understand chronic disease risk factor prevalence within a Delaware minority-serving higher education institution to provide increased prevention focus for these young adults that will develop into the future health of our population.

Methods

Population Description

This study was a quantitative cross-sectional research design. Surveys (*n* 457) were administered in classes, through social media, during campus activities, and through peer-driven campaigns over a three-year mini-grant cycle at Delaware State University (DSU), which assessed approximately 10.2% of the student population (*N* 4,471). DSU is one of America's Historically Black Colleges and Universities (HBCUs) located in Dover, Delaware with a 61% African-American enrollment.[8]

Measures

Ethical procedures for collecting student data included approval from the Institutional Review Board - Human Subjects Protection Committee. An exemption was granted under category three, and information obtained was recorded by the investigator in such a manner that the identity of the human subjects could not readily be ascertained directly or through identifiers linked to the subjects. The survey tool was adapted from the American Lung Association Tobacco Prevention/PANO Mini-Grant 2020-2022 participant survey to assess tobacco use, physical activity engagement, and dietary habits. Students in the public health program planning and evaluation course completed the peer-driven survey campaign (*n* 218) in hard copy, taking these surveys onto main campus for students to complete. At the same time, an online hosting platform, Anthology, was utilized to capture an additional *n* 239 students through on-campus events and social media campaigns.

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Data Analysis

Descriptive statistics were used to provide the prevalence of three leading risk factors of chronic disease by assessing 16 self-report behavioral questions and three demographic questions delineating gender, student classification, and race/ethnic group. Four risk factors associated with chronic disease were chosen to evaluate students' self-reported behavior regarding tobacco use, physical activity, and consumption of vegetables. The question regarding either the smoking of cigarettes or e-cigarettes (vaping) required a binary response to the questions, *"Have you smoked one or more cigarettes in the past 30 days?"*and/or "*Have you used e-cigarettes (also known as JUULs, vapes or hookah pens) in the past 30 days?"* To collect student data regarding physical activity level, students could choose from six responses to the following question, "*During the past seven days, on how many days were you physically active for a total of at least 60 minutes per day? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time)."* Responses to this question were coded as binary, collapsing values with 120 minutes and more time of physical activity engagement designated as the factor for meeting physical activity guidelines. A question regarding vegetable consumption was chosen to record a nutritional risk factor, "*Not including lettuce salads and potatoes, how often did you eat other vegetables? INCLUDE TOMATOES, GREEN BEANS, CARROTS, CORN, CABBAGE, BEAN SPROUTS, COLLARD GREENS, AND BROCCOLI. INCLUDE RAW, COOKED, CANNED, OR FROZEN VEGETABLES. DO NOT INCLUDE RICE*." Multiple responses to this question were coded binary, collapsing response values with those meeting dietary guidelines of four or more vegetables consumed daily designated as the factor for meeting nutritional guidelines. The data were analyzed in the R programming language using the Tidyverse suite of packages.[9] Counts and percentages by gender were made for the survey questions indicated above. In addition, counts of demographic features of the sample, including gender, race, and class, were calculated. This analysis identified patterns, trends, and relationships within the data, contributing to a comprehensive understanding of the research phenomenon under investigation. Survey sponsors were comprised of the American Lung Association and the Delaware Health and Human Services Physical Activity Nutrition Obesity Prevention Program.

Results

Out of survey respondents (*n* 457), 83% classified themselves as a person of color (*n* 380), with 74% identified as female (*n* 340) and 26% identified as male (*n* 117). The majority of participants were upperclassmen, with 34% juniors (*n* 154) and 28% seniors (*n* 129), followed by 17% sophomores (*n* 80), 11% freshmen (*n* 49), and 10% graduate students (*n* 45). Regarding tobacco use, 24.1% of survey respondents admitted to trying tobacco cigarettes, with 4.9% smoking in the last 30 days. In addition, 37.2% reported having tried e-cigarettes, with 11.8% reporting vaping in the previous 30 days. Vaping habits were used as preliminary data to inform a campus campaign, however data regarding tobacco use was combined into a binary variable that found 4.5% of respondents reported using tobacco in any form over the last 30 days In the latest version of the survey from the academic year 2021-2022, out of 92 respondents, 62.2% of students recorded having tried hookah, with 37.8% having utilized hookah in the last 30 days. A significant number of students, 65.6% (*n* 300), reported being physically active for 120+ minutes per week in an activity that increased their heart rate and made breathing hard some of the time, while 20.7% (*n* 96) reported 0 days of physical activity. The majority of students, 54.3% (*n* 253), described their weight as "about the right weight," with the second highest participant group

representing their weight as “slightly underweight” at 21.9% (*n* 102). Screen time behaviors outside of computer use for schoolwork were recorded as time spent ‘gaming,’ texting, or on social media. 20% of students reported not using their computer systems outside of schoolwork, with 40.3% recording three hours or more of screen time spent on their computer outside of schoolwork. Vegetable consumption was minimal in the sample, with only 5.7% (*n* 26) of the participants consuming the recommended four or more servings per day over the last seven days. Students reported 9.2% (*n* 42) not having consumed vegetables at all within the previous seven days and 22.1% (*n* 103) only consuming vegetables 1-3 times a week. Characteristics of the sample regarding risk factors discussed in this paper, use of tobacco products, physical activity levels, and consumption of vegetables can be found in Table 1.

Table 1. Population Characteristics of the Sample

Gender	Did Not Use Any Tobacco Products and Met the Physical Activity and Nutritional Guidelines.	Had a Cigarette and/or Vaped in Last 30 Days	Engaged in 120+ Min of Physical Activity in Last 7 Days	Consumed 4 Vegetables or More Daily Over the Last 7 Days
Female	*n* 9 (1.97%)	*n* 9 (2.65%)	*n* 211 (62.06%)	*n* 21 (6.18%)
Male	*n 2* (0.44%)	*n* 12 (10.26%)	*n* 89 (76.07%)	*n* 5 (4.27%)
Total Student Responses	*n 11 (2.41%)*	*n* 21 (4.59%)	*n* 300 (65.64%)	*n* 26 (5.68%)

Discussion

Understanding the progression from risk factors to chronic diseases highlights the importance of early detection, prevention strategies, and interventions to mitigate risk factors and reduce the burden of chronic disease. Behavioral disparities were discovered between the genders. A significantly higher number of males (10.3%) reported either smoking cigarettes or vaping in the past month, as opposed to their female counterparts (2.7%). The 2022 American College Health Association - National College Health Assessment (ACHA-NCHA) reported that tobacco or nicotine delivery products (cigarettes, e-cigarettes, Juul or other vape products, water pipe or hookah, chewing tobacco, cigars, etc.) use on campuses was 33.2%, females reporting at 32.2% and males at 35.8% use.[10] The ACHA-NCHA respondents averaged much higher than DSU respondents, both data sets were based on use in a 30-day period but the ACHA-NCHA compiled multiple delivery methods of tobacco products into one question, as opposed to the DSU survey which contained a question for each mode. The prevalence of current (30-day) cigarette smoking related to a 1998 study show a significant decline from 27.8% to 13% reported on the DSU campus.[11] This tobacco reduction could be based on “Tobacco Free” policies within the campus community, which prohibits tobacco use on campus grounds, in campus buildings, and on any campus property. However, more current tobacco behavior regarding e-cigarettes and Hookah use needs to be collected in youth populations who have been heavily targeted in recent years with the introduction of flavors and misconceptions regarding harmful practice. Questions

regarding aerobic health found that more men (76.1%) reported engaging in 120+ minutes of physical activity than women (62.1%) on campus. Within the 2022 ACHA-NCHA 68.7% of students reported meeting the 150 minutes minimal requirement for physical activity, 67.2% females and 74.4% men.[10] Although the number of DSU students reporting meeting the physical activity standards are higher than the national average, the DSU survey question followed the ALA/PANO suggested physical activity guidelines of 120 minutes per week. The percentages would exhibit a higher disparity if the question reflected the Department of Health and Human Services Physical Activity Guidelines for Americans 2nd Edition, which recommends 150 minutes of physical activity within a week, which is the same benchmark found within the 2022 ACHA-NCHA survey questions.[12] Nutritional intake for both genders was minimal, with only 6.2% of women and 4.3% of men reporting consuming the recommended daily allowance of four or more vegetables. A higher number of college students within the 2022 ACHA-NCHA survey reported consuming three or more servings of vegetables, averaging 18.1%; females reported at 18.1%, and males reported at 18.2%.[10] Disparities may be related to a lower vegetable consumption guidelines within the 2022 ACHA-NCHA, which was three compared with the DSU respondents reporting four or more vegetables per day. Within the ACHA-NCHA questionnaire fruit and vegetable consumption are asked within the same question which may also create unrelatable data when compared to the DSU data. Regarding risk factors discussed in this paper, only 2.5% (*n* 11) of students sampled did not use any tobacco products and met the physical activity and nutritional guidelines, behaviors known to reduce risk of chronic disease, which creates concern to the future health of this generation.

A better appreciation of today's students and their challenges can enable policymakers in higher education to develop effective strategies and outreach programs as stewards of our nation's young adults. Our college student population may reflect disparities found in marginalized groups within our society. There is a concern of heightened risk to this generation of learners for decreased access to basic resources, such as living in food deserts/swamps, not having safe places to engage in physical activity, and exposure to minority-targeted tobacco campaigns. A larger data set will allow researchers to investigate disparities by ethnicity to identify these gaps that need to be addressed.

Limitations

Data collected regarding risk factors is complex at best to get accurate measures, especially in self-report survey tools. This case was a convenience sample instead of a randomized sample of the student population, which could create results that may not accurately describe the population. Future quantitative studies need to provide a larger, randomized sample of the population, to include Hookah use, an increase in baselines metrics to 150 minutes per week for physical activity, and a broader question set for nutritional habits.

Public Health Implications

University systems are, by virtue, educational. Influential exposure to multiple value systems, including behavioral choices, can be used to introduce new concepts and choices when students are exposed to behavioral diversity. College then becomes a valuable setting that could affect a student's level of importance assigned to healthy behaviors that can influence chronic disease development and progression. To effectively and equitably address the chronic disease burden, public health and healthcare systems need to deploy integrated approaches that bundle strategies

and interventions, address many risk factors and conditions simultaneously, create population-wide changes, help the population subgroups most affected, and rely on implementation by many sectors, including public-private partnerships and involvement from all stakeholders. To help meet the chronic disease burden, the US Centers for Disease Control and Prevention (CDC) uses four cross-cutting strategies that our colleges and universities can employ: (1) epidemiology and surveillance to monitor trends and inform programs; (2) environmental approaches that promote health and support healthy behaviors; (3) health system interventions to improve the effective use of clinical and other preventive services; and (4) community resources linked to clinical services that sustain improved management of chronic conditions.[7] Institutions can provide significant opportunities to promote change through campus program infrastructure and policy. Investing in health promotion/prevention programming is a must to ensure we are developing an educated generation responsible for their personal health and well-being. Our responsibility in public health is to prevent, promote, and protect the populations we serve; these young adults in our care are the future health of our nation.

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References

1. CDC. (2022, December 21). *Mortality in the United States, 2021.* https://www.cdc.gov/nchs/products/databriefs/db456.htm
2. World Health Organization. (2014) Global status report on noncommunicable diseases. http://apps.who.int/iris/bitstream/10665/148114/1/9789241564854_eng.pdf?ua=1
3. Facts, U. S. A. (2023, Aug 7). Health in Delaware: statistics, rankings, and data trends on deaths, spending, life expectancy, and more. https://usafacts.org/topics/health/state/delaware/#1c799f2d-84db-4e0a-af3f-b95798e68b1b
4. WHYY. (n.d.). Delaware takes aim at health disparities that show higher rates of diabetes. https://whyy.org/articles/delaware-tracking-racial-health-disparities-online-dashboard-research-grant-diabetes/
5. Kolodziejczyk, J. K., Norman, G. J., Rock, C. L., Arredondo, E. M., Madanat, H., Roesch, S. C., & Patrick, K. (2014, November). Strategies that predict weight loss among overweight/obese young adults. *American Journal of Health Behavior*, *38*(6), 871–880. https://doi.org/10.5993/AJHB.38.6.9 PubMed
6. Ng, R., Sutradhar, R., Yao, Z., Wodchis, W. P., & Rosella, L. C. (2020, February 1). Smoking, drinking, diet and physical activity-modifiable lifestyle risk factors and their associations with age to first chronic disease. *International Journal of Epidemiology*, *49*(1), 113–130. https://doi.org/10.1093/ije/dyz078 PubMed
7. Vainshelboim, B., Bopp, C. M., Wilson, O. W. A., Papalia, Z., & Bopp, M. (2019, August 28). Behavioral and physiological health-related risk factors in college students. *American Journal of Lifestyle Medicine*, *15*(3), 322–329. https://doi.org/10.1177/1559827619872436 PubMed
8. Delaware State University. (2024). A proud legacy, a promising future. https://www.desu.edu/about

9. R Core Team. (2023). *R: A Language and Environment for Statistical computing*. R Foundation for Statistical Computing. https://www.r-project.org/

10. American College Health Association. (2022). Spring 2022 reference group executive summary. https://www.acha.org/documents/ncha/NCHA-III_SPRING_2022_REFERENCE_GROUP_EXECUTIVE_SUMMARY.pdf

11. Wechsler, H., Rigotti, N. A., Gledhill-Hoyt, J., & Lee, H. (1998, November 18). Increased levels of cigarette use among college students: A cause for national concern. *Journal of the American Medical Association*, *280*(19), 1673–1678. https://doi.org/10.1001/jama.280.19.1673 PubMed

12. Physical Activity Guidelines for Americans. 2nd Edition. (2019). https://health.gov/sites/default/files/2019-09/Physical_Activity_Guidelines_2nd_edition.pdf

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