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RESEARCH ARTICLE

Cardiovascular Risk Prevention in College-Age Students

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Abstract

Background: There is a steady increase in persons diagnosed with hypertension by a health care provider, including college-age students in Florida. There are over one million college-age students enrolled in public or private higher education programs in Florida. Surveys have shown that many of the college-age students screened for hypertension were informed that they had elevated blood pressures by a healthcare professional but indicated no follow-up.

Purpose: The purpose of this paper is to report the impact of a pilot health education and hypertension screening program conducted with college-aged students to become knowledgeable and empowered to recognize signs and symptoms of hypertension, risk factors associated with the disease, current prevention/ intervention strategies, and available medical treatment targeted towards preventing heart disease and stroke, outcomes of untreated or poorly managed hypertension.

Significance: Hypertension is one of the most common chronic treatable conditions, determined by an elevated systolic blood pressure (SBP) > 140 and a diastolic blood pressure (DBP) > 90. Primary prevention studies have shown that modifying lifestyle and dietary habits can help reduce the incidence of coronary heart disease. In Florida, there is a prevalence of hypertension among individuals aged 18-44 years-old. In the past, community health students have conducted screenings of college-age students during their clinical rotations and found that the mean age of college students participating ranged between ages 18-25.

Methods: This pilot project looked at the age range of college students and did not include ethnicity. The pilot project screened three groups of college students. The first group, group *H*, consisted of students in the general population. A representative sample was drawn from the population (group H) into 2 groups: Both groups of college-age students were enrolled in a Health and Wellness class. Group A consisted of students enrolled in the wellness training class, who did not receive the educational intervention provided by licensed registered nurses enrolled in a Bachelor of Science Nursing program; while students in group B received education on diet, exercise, and heart disease education targeted towards maintaining a healthy weight and blood pressure.

Interventions: Community health nursing students conducted health screenings over a 4-week period, including BP, pulse, pulse oximetry and respirations, vision checks, height and weight and nutritional assessments (for BMI calculations), and pulmonary function tests (assessed via peak flow meters). Health education teachings were provided to Group B, the experimental student group. All data collected was recorded each week by student researchers.

Conclusions: This pilot study demonstrated that effective lifestyle changes supported by weekly health educational programs, biometric screenings, dietary adjustments, and weight management, can have a positive impact on hypertension. An extended approach to this program can lead to an awareness of hypertension and decrease the incidence and burden of chronic hypertension among college-age students.

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Keywords

Cardiac risk prevention, Hypertension, College-age students

Introduction

Blood Pressure (BP) refers to the pressure exerted by the blood as it pushes against the walls of the arteries; hypertension (HTN) is a condition in which the blood pressure becomes elevated above the normal range which results in damage to the heart and other health issues [1]. According to the Centers for Disease Control and Prevention (CDC) (n.d.), in 2017, 6.9% of adults in Florida between the ages of 18 and 24, 14.0% of adults in Florida between the ages 25 and 34, and 18.6% of adults in Florida between the ages of 35 and 44 admitted to being told that they had HTN by a healthcare professional. In 2019, the number increased for adults aged 18 to 44 years to 33% having been told of their HTN status [2]. According to the most recent data estimates by the College Evaluator [3], there are 1,074,928 students enrolled in the 28 Florida College System institutions for the academic year 2021-2022, with male students representing 440,809 and female students at 634,119. The results showed that among this 18-44 age group, the prevalence of HTN among adults who had ever been told that they had HTN was 14.1%, a decrease from previous years [4].

In the past, community health students have conducted screenings of college-age students during their clinical rotations. They found that the mean age of college students participating ranged between ages 18-25 and did not include ethnicity. Therefore, this pilot project looked at the age range of college students and did not include ethnicity. The pilot project screened three groups of college students. The first group, group *H*, consisted of students in the general population. A representative sample was drawn from the population (group H) into 2 groups: Groups A consisted of students enrolled in the wellness training, while students in group B received wellness training and cardiovascular education. The purpose of this pilot project was to generate college community data for a trend analysis and to determine if there is a difference in BP readings and Body Mass Index (BMI) readings following a Wellness class training and cardiovascular education by registered nurses.

Statement of the Problem

In this pilot project, the statement of the problem is, "Despite the surplus of information on hypertension available to college students through the local community college curriculum, library services, and educational programs, the effectiveness of Wellness class training and health education on positively impacting the prevalence of hypertension in the local community college remains unclear".

Research Question and Hypothesis

The overarching research question for this pilot project was "To what extent, if any, do Wellness class training and health education are associated with changes in BP and BMI readings in college age students? The hypothesis for this pilot project stated, "There is no difference in BP and BMI readings following Wellness class training and cardiovascular education provided by registered nurses". The independent variables in this pilot project were the Wellness class training and education provided by registered nurses. The education provided by the nurses included general information on HTN, risk factors, and lifestyle modifications that could be implemented. The dependent variables were the BP readings, Heart Rate (HR), and BMI.

Literature Review

The Cumulative Index of Nursing and Allied Health Literature (CINAHL) database was used to conduct research on the recent literature available on this problem from the United States of America, and keywords used were hypertension, high blood pressure, elevated blood pressure, college students, university students, and undergraduate students. There were two studies that were reviewed. The study was an extended data analysis from a previously published study and descriptive analysis of cardiovascular disease (CVD) risk factors among college students of two specific universities and regions conducted by [5], titled "Differences in Cardiovascular Risk Factors in College Students: Midwest Versus Southwest". This study explored the CVD risk factors through the collection of biological and anthropometric data such as BP, BMI, lipid panels, and glucose levels, as well as the participants' knowledge on CVD, and the participants' perceptions about their personal cardiovascular risks. The aim was to "identify underlying cardiovascular risk factors among college students including lifestyle characteristics, health behaviors and knowledge, and perception of the risk factors" (p.571). They found that college students were a population at high risk for developing CVD, with Midwest students having a higher mean rank for Systolic Blood Pressure (SBP) and Southwest students having a higher mean rank for Diastolic Blood Pressure (DBP), and that college students tended to overlook their risk for developing CVD.

The second study was a cross-sectional, descriptive, correlational study conducted by [6], titled "Examining the Relationship between Mindfulness, Perceived Stress, and Blood Pressure in African-American College Students". They explored tobacco and alcohol use, blood pressure, mindfulness, and perceived stress of students who were in a course designed to educate them on CVD risk factors, and the influence of lifestyle behaviors on the risk for developing chronic diseases. The aim of the study was "to evaluate the correlations among mindfulness, perceived stress, and blood

pressure among a group of African-American college students enrolled in a healthy heart course at an HBCU" (p.16). They found that there was a statistically significant negative correlation between mindfulness and perceived stress (students more mindful about their risks exhibited a reduction in their perceived stress), and the average SBP and DBP readings for these students were 122 mmHg (prehypertensive) and 76 mmHg (normotensive) respectively.

Although every study provided insightful nursing knowledge, none of the research articles addressed any college institution in South Florida.

Theoretical Framework

The theoretical framework for this pilot project stemmed from the Neuman Systems Model which emphasizes the interaction between patients and their environmental stressors, as well as how the patients' systems react to these stressors [7]. The concepts used from this model were the open client system and prevention-as-intervention which derives from Neuman's Systems Model as a framework for nursing practice. The former refers to the view that patients are systems composed from five variables (physiological which is the body structure and function, psychological which is mentation, sociocultural which is the combined influence of societal norms and culture, developmental which is related to age, and spiritual which is the impact of spiritual beliefs) which interact with the environment [7]. Within this concept, the study focused on the physiological variable of the patients' systems, specifically the cardiovascular function (BP and HR), height, weight, and BMI. The latter encompasses three levels of prevention: The first is primary prevention-as-intervention which is used to protect the patients' systems, promote optimal wellness, and reduce risk factors, the second is secondary prevention-as-intervention which aims to strengthen the patients' line of resistance to illness and treat symptoms, and the third is tertiary prevention-as-intervention which involves treatment and stabilization of the patients' systems [7].

This pilot project used primary prevention intervention in the form of educational materials for both group *H* and group *B*, as well as the secondary prevention intervention in the form of health screenings for all three groups.

Design

The design for this pilot project was a quasi-experimental quantitative design, more specifically, Comparison Group Pre-test/Post-test Design. Group *H* was screened to generate data on the BP and BMI findings of the local college's students. A representative sample was drawn from the population of students (Group H) and participants were assigned to groups A and B. Group *A* received pre and posttest BP and BMI screenings plus the Wellness class training and no educational intervention, while Group *B* received pre and posttest BP and BMI screenings, wellness training, as well as the educational interventions.

Method

Community health nurses, who are RN-BSN students, surveyed group *H* to conduct health screenings over a 4-week period. The health screenings included: cardiovascular checks (BP, pulse, pulse oximetry and respirations), vision checks, height and weight and nutritional assessments (for BMI calculations), and pulmonary function tests (assessed via peak flow meters). All data collected was recorded each week by student researchers. However, there were employees (housekeeping staff members and one local police officer) that were screened but not included in the overall count. All participants verbally agreed to participate in the health screening project.

Concurrently, the community health nurses conducted health screenings on selected Wellness classes each week. The health screenings included: cardiovascular checks (BP, pulse, pulse oximetry and respirations) and height, weight, and BMI assessments for group *A* and group *B*. The pretest screenings and posttest screenings were six weeks apart, and the intervention (see Appendix A) was initiated to group *B* four weeks before the posttest data was retrieved.

For all the groups, this pilot project used the Eight Joint National Committee (JNC 8) hypertension guidelines to classify the BP findings: Normotension referred to a SBP < 120 mmHg and DBP < 80 mmHg, prehypertension referred to a SBP between 120-139 mmHg and/or DBP 80-89 mmHg, stage I hypertension referred to a SBP 140-159 mmHg and/or DBP 90-99 mmHg, and stage II hypertension referred to a SBP greater than 160 mmHg and/or DBP greater than 100 mmHg [8]. Additionally, for all groups, the project used the National Center for Health Statistics (NCHS) BMI classification system: Underweight referred to a BMI less than 18.5 kg/m^2, normal weight referred to a BMI 18.5-24.9 kg/m^2, overweight referred to a BMI 25.0-29.9 kg/m^2, obese referred to a BMI 30.0-39.9 kg/m^2, and morbidly obese referred to a BMI greater than 40.0 kg/m^2 [9].

The study employed a 3-step empirical approach. First, descriptive statistics were used to explore participants overall characteristics such as age, gender, weight, BMI, BP etc. Second, a paired t-test were used to determine whether there was a statistically significant difference between pre-test and post-test measures within each group on BMI and BP. Third, one-way ANOVA was employed to investigate if there is a statistically significant difference on BMI and BP post intervention between groups A and B. The study aims to test whether wellness education is positively associated with improvements on BMI and BP, as well as the combination of wellness education and educational interventions.

Data Analysis

Group H

For group *H* there was a total of 53 participants, of which 22 identified as male and 31 identified as female. This sample was a convenience sample. This pilot project found that 21 students were normotensive, 24 were prehypertensive, 6 had stage I HTN, and 2 had stage II HTN. The lowest or minimum (Min.) SBP value was 100 and the highest or maximum (Max) SBP value was 169. The lowest or minimum (Min.) DBP value was 58 and the highest or maximum (Max) was 143. A summary of the average SBP and DBP values are listed in Table 1 and Table 2.

Regarding BMI, this pilot project found that the average of the surveyed population fell within an overweight BMI. The lowest BMI fell into the underweight BMI class, the middle BMI fell into the overweight BMI class, and the maximum BMI of this population fell into the morbidly obese BMI class. The values from this surveyed population are listed in the Table 3.

Group A: comparing pre and post results: For group *A* there was a total of 17 participants, of which 12 identified as male (71%) and 5 identified as female, the age range for this sample was 18 to 44-years-old, with the male participants ranging from 18 to 44-years-old and the female participants ranging from 18 to 20-years-old as seen in Table 4.

Group A: blood pressure results: The pretest data revealed that 58.8% of participants had a normal BP, 29.4% of participants were prehypertensive, 11.8% had stage I HTN, and 0% had stage II HTN. The posttest data revealed that 29.4% of participants had a normal BP, 52.9% were prehypertensive, 17.7% had stage I HTN, and 0% had stage II HTN. However, posttest data showed a shift where majority of the students became prehypertensive (see Table 5). Results also revealed relevant gender differentials. Results suggested that there was a shift that resulted in a higher percentage of males having stage I HTN during the posttest (see Table 5). The pretest data revealed that 58.33% of the male participants had a normal BP, 33.33% of participants were prehypertensive, 8.33% had stage I HTN, and 0% had stage II HTN. The posttest data revealed that 50% of participants had a normal BP, 33.3% of participants were prehypertensive, 16.7% had stage I HTN, and 0% had stage II HTN.

Most of the female participants were normotensive during the pretest, however, the posttest data revealed an increase in the number of prehypertensive females 60% of participants had a normal BP, 20% of participants were prehypertensive, 20% had stage I HTN, and 0% had stage II HTN. The posttest data revealed that 0% of participants had a normal BP, 80% of participants were prehypertensive, 20% had stage I HTN, and 0% had stage II HTN (See Table 5).

To test the hypothesis that blood pressure pre-intervention (Systolic $M = 118.3$, $SD = 13.3$; Diastolic $M = 74$, $SD = 10.7$) and post-intervention (Systolic $M = 126.7$, $SD = 14.3$; Diastolic $M = 75.4$, $SD = 10.1$) means were

Table 1: Summary of Group H's BP findings.

Blood Pressure Classification	Frequency
Normotension	21
Prehypertension	24
Stage I Hypertension	6
Stage II Hypertension	2

Note: The data revealed that 39.6% of participants were normotensive, 45.3% of participants were prehypertensive, 11.3% of participants had stage I HTN, and 3.8% of participants had stage II HTN.

Table 3: Summary of the group HBMI averages.

Body Mass Indexes	
Min. value	16.99
Mean value	27.79
Median value	25.53
Max value	52.07

Table 4: Group A: Participants demographics.

Demographic Characteristics	N	%
Number of Participants	17	
Age		
Max	44	
Min	18	
Mean ± SD	22.7 ± 6.83	
Gender		
Males	12	71%
Females	5	29%

Table 2: Summary of the SBP and DBP Findings for Group H.

Systolic Blood Pressure			Diastolic Blood Pressure		
Min. value	100	100	Min. value	58	58
Mean value	124.5	125.5	Mean value	77.3	76.1
Median value	125	124.5	Median value	76	76
Max value	169	160	Max value	143	100

Note: The values in red include the outlying blood pressure value 169/143 in the respective calculation. The averages showed that the average population fell in the prehypertensive range.

Table 5: Summary of the Group A BP Classifications for the Pretest and Posttest.

Blood Pressure Classification	Pretest		Posttest	
	Frequency	%	Frequency	%
All Participants				
Normotension	10	58.8%	5	29%
Prehypertension	5	29.4%	9	53%
Stage I Hypertension	2	11.8%	3	18%
Stage II Hypertension	0	0.0%	0	0%
Male				
Normotension	7	58%	6	50%
Prehypertension	4	33%	4	33%
Stage I Hypertension	1	8%	2	17%
Stage II Hypertension	0	0%	0	0%
Female				
Normotension	3	60%	0	0%
Prehypertension	1	20%	4	80%
Stage I Hypertension	1	20%	1	20%
Stage II Hypertension	0	0%	0	0%

Table 6: Group A: Paired *t* Test Results.

Blood Pressure	Mean	Std. Dev	Paired *t* test		
			t value	*df*	sig (Two- tailed)
Systolic					
Pre	118.3	13.29	2.771	16	0.01
Post	126.7	14.299			
Diastolic					
Pre	74	10.68	1.114	16	0.02
Post	75.35	10.09			

Table 7: Group A: Body Mass Index Classifications for the Pretest and Posttest Total and by Gender.

Body Mass Index Classification	Pretest		Posttest	
	Frequency	%	Frequency	%
All Participants				
Underweight	3	18%	1	6%
Normal weight	6	35%	8	47%
Overweight	4	24%	4	24%
Obese	3	18%	3	18%
Morbidly Obese	1	6%	1	6%
Males				
Underweight	3	25%	1	8%
Normal weight	3	25%	5	42%
Overweight	3	25%	3	25%
Obese	2	17%	2	17%
Morbidly Obese	1	8%	1	8%
Females				
Underweight	0	0%	0	0%
Normal weight	3	60%	3	60%
Overweight	1	20%	1	20%
Obese	1	20%	1	20%
Morbidly Obese	0	0%	0	0%

equal, a paired t-test was performed. Prior to conducting the analysis, the assumption of normally distributed differences scores was examined. The assumption was considered satisfied, as the skew and kurtosis levels were estimated at -1.672 and 1.144, respectively. The correlation also estimated at $r = 0.61$, $p < 0.005$ and suggested the appropriate use of this test. The null hypotheses were rejected, t (16) = 2.77, $p < 0.01$, t (16) = 1.11, $p < 0.02$. Therefore, the blood pressure post-intervention was statistically significantly higher than pre intervention. Cohen's d was estimated at 0.67 which is a large effect based on Cohen's guidelines (See Table 6).

Group A: body mass index

For group *A,* the pretest data revealed that 17.6% of participants were underweight, 35.3% of participants were of normal weight, 23.5% of participants were overweight, 17.6% of participants were obese, and approximately 6% were morbidly obese. The posttest data revealed that 5.9% of participants were underweight, 47.1% of participants were of normal weight, 23.5% of participants were overweight, 17.6% of participants were obese, and 5.9% were morbidly obese. Therefore, the pretest data revealed that majority of these students had a normal weight, however, posttest data showed a shift where underweight students gained weight and became of a normal weight.

Most of the male participants were underweight, had a normal weight, or overweight during the pretest. The posttest data revealed a weight gain in underweight students, which shifted most students to the normal weight BMI class (see Table 7). 60% of the female participants had a normal weight during the pretest, and posttest data revealed no changes (see Table 7).

To test the hypothesis that BMI and weight pre intervention (BMI $M = 25.7$, $SD = 6.86$; Weight $M = 77.1$, $SD = 22.7$) and post intervention (BMI $M = 26.2$, $SD = 6.87$; Weight $M = 78.8$, $SD = 23.1$) means were equal, a paired t-test was performed. Prior to conducting the analysis, the assumption of normally distributed differences scores was examined. The assumption was considered satisfied, as the skew and kurtosis levels were less than the maximum allowable values for a t-test (skew < |2.0| and kurtosis < |9.0|). For BMI, the correlation also estimated at $r = 0.89$, $p < 0.01$ and suggested the appropriate use of this test. For weight, the correlation also estimated at $r = 0.91$, $p < 0.01$ and suggested the appropriate use of this test.

The null hypotheses for BMI and weight were rejected, t (16) = 2.704, $p < 0.01$ and t (16) = 2.514, $p < 0.01$, respectively (See Table 8). Therefore, the BMI and weight measurements post intervention were statistically significantly higher than pre intervention. Cohen's d was also estimated. For BMI the effect size was estimated at 0.2 which is a small effect based on Cohen's guidelines, while the effect size for the weight mean difference was a large effect size (Cohen's d was estimated at 0.7).

Group B comparing pre and post results

For group *B* there was a total of 23 participants, of which 10 identified as male and 13 identified as female, as seen in Table 9. The age range for this sample was 17 to 23 during the pretest and 17 to 24 during the posttest because of birthdays that occurred between the pretest and posttest. The age range for the male participants was 18 to 23-years-old, and the female participants' age range was 17 to 23-years-old for the pretest and 17 to 24-years-old for the posttest (See Table 9).

Group B: blood pressure results

The pretest data revealed that majority of these students were normotensive (48%), 35% of participants were prehypertensive, 17% had stage I HTN, and no student had stage II HTN. however, posttest data showed that while most the students remained normotensive, there was an increase in the number of students who were prehypertensive, had stage I HTN, and stage II HTN (see Table 10). Thus, the posttest data revealed that 43.5% of participants had a normal BP, 30.4% were prehypertensive, 21.75% had stage I HTN, and 4.35% had stage II HTN.

When separated by sex, most of the male participants were prehypertensive during the pretest, however, there was a shift that resulted in most of the males having stage I HTN during the posttest, and an increase in male participants who were normotensive (see Table 10). The

Table 8: Group A: Paired *t* Test Results – BMI.

BMI	Mean	Std. Dev	Paired *t* test		
			***t* value**	***df***	**sig (Two- tailed)**
BMI					
Pre	25.7	6.86			
Post	26.2	6.87	2.704	16	0.01
Weight					
Pre	77.1	22.74			
Post	78.8	23.13	2.514	16	0.00

posttest data revealed that 30% of the male participants had a normal BP (compared to 10% in the pretest), 20% of participants were prehypertensive (compared to 50% in the pretest), 50% had stage I HTN (compared to 40% in the pretest), and no participant had stage II HTN.

Most of the female participants were normotensive during the pretest; however, posttest data showed that while most the students remained normotensive, there was an increase in the number of students who were prehypertensive (see Table 10). The posttest data revealed that 54% of participants had a normal BP (compared to 77% in the pretest), 38% of participants were prehypertensive (compared to 23% in the pretest), 0% had stage I HTN, and 8% had stage II HTN (compared to no participant in the pretest phase).

To test the hypothesis that blood pressure pre intervention (Systolic M = 123.7, SD = 12.7; Diastolic M = 74.4, SD = 10.5) and post intervention (Systolic M = 126.1, SD = 17.7; Diastolic M = 76.1, SD = 20.1) means were equal, a paired t-test was performed. Prior to conducting the analysis, the assumption of normally distributed differences scores was examined. The assumption was considered satisfied, as the skew and kurtosis levels were below the appropriate guidelines. The correlation also estimated at $r = 0.55$, $p < 0.007$ and suggested the appropriate use of this test. The results failed to reject null hypotheses; t (22) = 0.77, $p < 0.45$; t (22) = 0.37, $p < 0.72$. Therefore, there are not enough evidence to suggest that there is a statistical means difference on blood pressure between pretest and posttest in group B (See Table 11).

Table 9: Group B: Participants Demographics.

Demographic Characteristics	N	%
Number of Participants	23	
Age		
Max	23	
Min	17	
Mean ± SD	19.4 ± 1.73	
Gender		
Males	10	43%
Females	13	57%

Table 10: Group B: Body Mass Index Classifications for the Pretest and Posttest Total and by Gender.

Blood Pressure Classification	Pretest		Posttest	
	Frequency	%	Frequency	%
All Participants				
Normotension	11	48%	10	43%
Prehypertension	8	35%	7	30%
Stage I Hypertension	4	17%	5	22%
Stage II Hypertension	0	0%	1	4%
Male				
Normotension	1	10%	3	30%
Prehypertension	5	50%	2	20%
Stage I Hypertension	4	40%	5	50%
Stage II Hypertension	0	0%	0	0%
Female				
Normotension	10	77%	7	54%
Prehypertension	3	23%	5	38%
Stage I Hypertension	0	0%	0	0%
Stage II Hypertension	0	0%	1	8%

Table 11: Group B: Paired t Test Results.

Blood Pressure	Mean	Std. Dev	Paired t Test		
			t value	df	sig (Two- tailed)
Systolic					
Pre	123.7	12.7			
Post	126.1	17.7	0.77	22	0.45
Diastolic					
Pre	74.4	10.5			
Post	76.1	20.1	0.37	22	0.72

Group B: body mass index and weight results

For group *B,* the pretest data revealed that 57% of these students had a normal weight, 9% of participants were underweight, 13% of participants were overweight, 22% of participants were obese, and 0% were morbidly obese. While most of the students remained in the normal weight BMI class, the number of overweight students increased. The posttest data revealed that 4% of participants were underweight, 52% of participants were of normal weight, 22% of participants were overweight and 22% of participants were obese (see Table 12).

When separated by sex, most of the male participants had a normal weight during the pretest and the posttest. Likewise, most of the female participants had a normal weight (46%) during the pretest. However, the proportion of overweight students increased from 23.1% (pretest) to 38% (posttest) (see Table 12).

To test the hypothesis that BMI and weight pre intervention (BMI M = 24.5, SD = 4.85; Weight M = 75.9, SD = 21.9) and post intervention (BMI M = 25.1, SD = *4.81*; Weight M = 71.7, SD = 16.7) means were equal, a paired t-test was performed. Prior to conducting the analysis, the assumption of normally distributed differences scores was examined. The assumption was considered satisfied, as the skew and kurtosis levels were less than the maximum allowable values for a *t*-test (skew < |2.0| and kurtosis < |9.0|). For BMI, the correlation also estimated at $r = 0.85$, $p < 0.01$ and suggested the appropriate use of this test. For weight, the correlation also estimated at $r = 0.54$, $p < 0.01$ and suggested the appropriate use of this test.

The null hypotheses for BMI and weight were rejected, t (22) = -1.06, $p < 0.02$ and t (22) = 3.48, $p < 0.00$, respectively (See Table 8). Therefore, weight readings post intervention was statistically significantly lower than pre intervention. However, BMI post interventions were statistically significantly higher than pre intervention. However, the difference was less than 1 unit. Cohen's *d* was also estimated. For BMI and weights effect sizes were estimated at 0.7 0.2 which is a large effect based on Cohen's guidelines Table 13.

Comparing group, A & B results on blood pressure and BMI results

The descriptive statistics associated with posttest results for Blood Pressure and BMI results are reported in Table 14. The results suggest that groups A and B had similar results regarding blood pressure readings, while group B had lower BMI and weights compared to groups A. Findings from paired *t*-test by group suggested that blood pressure BMI and weight measurements post intervention were statistically significantly higher than pre intervention for group A. However, for group B there was not enough evidence to suggest that there is a statistical mean difference on blood pressure between pretest and posttest, while BMI results were slightly higher in the posttest and weight measurements were statistically significantly lower than pre intervention.

To test the hypothesis that type of intervention (Wellness class training and Wellness class training

Table 12: Group B Body Mass Index Classifications for Participants' Pretest and Posttest Total and by Gender.

Body Mass Index Classification	Pretest		Posttest	
	Frequency	%	Frequency	%
All Participants				
Underweight	2	9%	1	4%
Normal weight	13	57%	12	52%
Overweight	3	13%	5	22%
Obese	5	22%	5	22%
Morbidly Obese	0	0%	0	0%
Male				
Underweight	0	0%	0	0%
Normal weight	7	70%	7	70%
Overweight	1	10%	1	10%
Obese	2	20%	2	20%
Morbidly Obese	0	0%	0	0%
Female				
Underweight	2	15%	1	8%
Normal weight	6	46%	5	38%
Overweight	2	15%	4	31%
Obese	3	23%	3	23%
Morbidly Obese	0	0%	0	0%

Table 13: Group B: Paired *t* Test Results - BMI.

BMI	Mean	Std Dev	Paired *t* Test		
			t value	*df*	sig (Two- tailed)
BMI					
Pre	24.5	4.85			
Post	25.1	4.81	3.48	22	0.00
Weight					
Pre	75.9	21.9			
Post	71.7	16.7	-1.67	22	0.02

Table 14: Descriptive Statistics: Posttest BMI and BP Results between Groups A and B.

	N	*M*	SD
Blood Pressure			
Systolic			
Group A	17	126.7	14.299
Group B	23	126.1	17.7
Diastolic			
Group A	17	75.4	10.09
Group B	23	76.1	20.1
BMI			
Group A	17	26.2	
Group B	23	25.1	4.81
Weight			
Group A	17	78.8	
Group B	23	71.7	16.7

combined with educational intervention) across groups A and B is associated with changes in BMI and BP readings post intervention, a between-groups ANOVA was performed.

Prior to conducting ANOVA, the assumptions of normality and homogeneity of variances were also tested.

Differences on blood pressure

Systolic pressure differentials: The assumption of normality was evaluated and determined to be satisfied as skewness and kurtosis estimates were less than |2.0| and |9.0|. The assumptions of homogeneity of variances were also tested and satisfied based on Leven's *F* test, F (1,38) = 1.081, $p = 0.305$. The independent between-groups ANOVA yielded a not statistically significant effect, F (1,38) = 0.12, p = 0.913, η^2 = 0.01. Therefore, there is not enough evidence to suggest that there is mean difference on Systolic pressure between groups A and B.

Diastolic pressure differentials: The assumption of normality was evaluated and determined to be satisfied as skewness and kurtosis estimates were less than |2.0| and |9.0|. The assumptions of homogeneity of variances were also tested and satisfied based on Leven's *F* test, F (1,38) = 1.109, p = 0.29. The independent between-groups ANOVA yielded a not statistically significant effect, F (1,38) = 0.22, p = 0.884, η^2 = 0.001. Therefore, similar systolic pressure results, there is not enough evidence to suggest that there is mean difference on Systolic pressure between groups A and B.

Differences on BMI index and weight measurements

BMI index: Like the other dependent variables, assumption of normality and homogeneity of variances were also tested and satisfied. A one-way analysis of variance suggested that there is no statistically posttest mean difference on BMI between groups A and B, F (1,38) = 0.356, p = 0.554, η^2 = 0.009.

Weight differentials: As stated before, group B weight readings after the intervention was statistically lower when compared to the group pretest results. However, one-way ANOVA estimates indicate that there is not enough evidence to suggest that the means are different, F (1,38) = 1.284, p = 0.264, η^2 = 0.033.

Discussion

The components of this pilot project were met appropriately. This data will add more knowledge to nursing regarding the trend of HTN and BMI among college students at a local community college in South Florida. This pilot project's strengths include its provision of data for a trend analysis and the insight it provided on the effect of Wellness class training and cardiovascular education on college students. The pilot project's limitations were the small sample size for group *A* and group *B* and limited stratification.

The students surveyed were engaged and receptive during health screenings. Several participants spent time with the RN to BSN students inquiring about healthy habits. Some students that were not participants of the survey returned the following week to have their BP checked. Healthy food choices and exercise regimens were discussed in-depth. Participants showed interest in how to manage and prevent BP problems in the future. Educational pamphlets were given to reinforce the information learned. The community health nurses determined that college students can greatly benefit from continued free health screenings and education sessions on their campus.

College students are typically on a tight budget. As a result of their modest available funds, limited time, and food storage space, college students tend to seek out quick, non- perishable meals. Ramen noodles, potato chips, soda, and canned food are just a few of the less desirable items this population tends to frequently eat. Educating the students about ways to eat low salt foods on a budget would prove beneficial. A few suggestions would be low sodium cheese, unsalted nuts, unsalted popcorn, eggs, fresh vegetables like baby carrots and cucumbers, hummus, and fresh fruits like apples and oranges.

Conclusions

In conclusion, based on the health screenings conducted over 4 weeks on group *H*, the average student of this institution was determined to be prehypertensive and overweight. Group *A* had pretest data that affirmed that more than half of the students were normotensive, but over 4 weeks most of the students progressed to being prehypertensive (posttest data). Moreover, the pretest and posttest data revealed that most of the students had a normal weight over a 4-week timespan. However, the posttest data revealed that most of the underweight students gained weight to increase the overall percentage of students with a normal weight.

It is also important to note that paired *t*-test results showed that blood pressure readings post intervention were statistically significantly higher than pre intervention. Cohen's *d* was estimated at 0.67 which is a large effect based on Cohen's guidelines. BMI and weight measurements post intervention were also statistically significantly higher than pre intervention.

For group *B,* the pretest data revealed that more than half of the students were normotensive. However, despite the educational intervention, while more than half of these students remained normotensive, there was an increase in the number of prehypertensive students, students who had stage I HTN, and students with stage II HTN. Additionally, there was not enough evidence to suggest that there is a statistical means difference on blood pressure between pretest and posttest in group B. However, weight readings post intervention was statistically significantly lower than pre intervention, while BMI post intervention were statistically significantly higher than pre intervention.

Posttest results between groups also did not yield statistically significant differences on blood pressure, BMI and weight reading between groups A and B. This may be the result of a premature posttest data retrieval as the students have the Wellness class training for 16 weeks. Therefore, a recommendation for a future study is retrieving a second set of posttest data at 8 weeks and 12 weeks to monitor the changes in their BP and conducting a focused group on eating habits and lifestyle. While most students remained in the normal weight BMI class, the pretest data revealed that most of these students had a normal weight and after the educational intervention, the percentage of students with a normal weight increased and the number of underweight students subsequently decreased.

Recommendations for Future Study

During previous screenings conducted by community health nursing students, the reports showed that the mean age of college students participating ranged between ages 18-25. For future studies, the age range should increase from 18 to 25 to 18 to 45, given the age gaps in adult learners. The study should also include ethnicity for those students experiencing HTN/pre-hypertension to determine additional interventions needed.

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