

A QUANTITATIVE ASSESSMENT OF THE IMPACT OF NUTRITIONAL CHOICES, QUALITY OF SLEEP AND PHYSICAL ACTIVITY ON THE GENERAL HEALTH OF STAFF AND STUDENTS AT THE ALL SAINTS UNIVERSITY SCHOOL OF MEDICINE, DOMINICA

ABSTRACT

This study utilized a quantitative approach to investigate the impact of nutritional choices, quality of sleep and physical activity on the general health of staff and students at the All Saints University School of Medicine, Dominica. Fourteen staff members and 63 students participated in the survey. The Nutritional Assessment Instrument of the Government of Northwest Territories was utilized to assess the nutritional choices of participants, the Pittsburgh Sleep Quality Index (PSQI) was used to determine the quality of sleep, the International Physical Activity Questionnaire—Short Form was used to assess the physical activity while the SF-36 Questionnaire was utilized to assess the general health of participants. The mean general health of participants was 75.46 (SD = 15.44) out of a maximum of 100. Nutritional choices ($r = .270$, $P = .018$), quality of sleep ($r = .387$, $P < .001$) and physical activity ($r = .237$, $P = .040$) all had significant positive correlations with general health. A regression analysis indicated that quality of sleep ($B = 13.881$, $p < .001$) and nutritional choices ($B = 10.352$, $p = 0.002$) were the best predictors of general health while physical activity ($B = 4.099$, $p = .063$) also had a weak but non-significant positive contribution. While males had a higher mean general health compared to females, this difference was not statistically significant ($P > .05$). However, the mean general health of staff was higher than that of students and this difference was statistically significant ($P < .05$). The study recommends an improvement in sleep quality, nutritional choices and physical activity and recommends, among others, the following: education of students on the need to observe good nutritional choices, quality of sleep and exercises; establishment of a cafeteria that offers healthy foods and snacks, and the creation of a Fitness Club in the University. The authors recommend that a similar study should be conducted in other institutions, especially governmental agencies and religious organizations in Dominica, as well as in other Caribbean medical universities. A further study into how nutritional choices, quality of sleep and physical activity are related to specific non-communicable diseases such as obesity, high blood pressure and diabetes mellitus in the Caribbean, using both quantitative and qualitative approaches, is also recommended.

Keywords: nutritional choices, quality of sleep, physical activity, general health, medical University, dominica

INTRODUCTION

Many factors outside of the hospital setting have been shown to contribute to people's health (Holdsworth, 2019). These include good nutrition, adequate sleep and physical exercise (Correa et.al, 2017; Moreno et.al, 2014; Warburn et.al, 2006). Warburn et.al (2006) reported that physical activity helped to prevent several disorders including obesity, diabetes, cardiovascular disorders and cancers. The authors also reported that there appeared to be a linear positive relationship between the extent of physical activity and the health status of individuals, and that the instructions from Health Canada produced health benefits to people (Warburn et.al, 2006). Correa et.al (2017) reported that disruption of sleep affects the circadian cycle and this could lead to poor performances, including poor academic performance of students. Medic et.al (2017) reported that disruption of sleeps have been linked to several health disorders, including pains, emotional stress, gastrointestinal and cardiovascular disorders, hypertension and hyperlipidemia. Likewise, dietary habits have been found to affect the body's homeostasis and poor nutritional choices have been linked to several health disorders (Moreno et.al, 2014). Recently, there has been an awakening to address the health issues of young people as this can help to prevent lifelong bad choices and also enhance efficiency of healthcare services (Viner & Barker, 2005). Rosi et.al (2019) conducted a review on eating habits of the youths in Europe, North America and Oceania and found out that the youths did not fully follow nutritional recommendations for foods such as vegetables, fruits and legumes. Neither did they follow the recommendations on sodium intake. No such research had been conducted in Dominica.

Improving the dietary habits of people may require educational and behavioural interventions (Rosi et.al, 2019). This research was conducted to assess the nutritional choices, quality of sleep and physical activities of staff and students at the All Saints University School of Medicine and to investigate any impact the variables may have on the health and wellness of these people. This is very important because *health is wealth*, as the saying goes. Good health would amount to high efficiency and productivity for both staff and students of the institution. Findings from this research contribute to the body of knowledge and also would help the students and staff of the All Saints University to gain better appreciation of how sleep quality, diets and physical activity may be crucial to overall health. Moreover, these findings would help

policy makers and the general public to gain better insights into how good feeding habits, good quality of sleep and good exercise could help to improve the general health of people.

Research Problem Statement

The main problem is that poor dietary choices, poor sleep quality and decreased physical activity have been reported to be linked to a lot of health disorders in different parts of the world. A study of this nature had not been conducted in Dominica and especially at the All Saints University. In view of the fact that non-communicable diseases abound in many parts of the world, including Dominica, and most of these diseases have been linked to diets, inadequate sleep and physical inactivity, this present study was conducted to assess these factors and create more awareness for improved healthy lifestyles, especially among the students.

Theoretical Framework

This research study is based on the health belief model (Jones et.al, 2015) which states that there would be positive behavioural changes in people if the target obstacles, profits, advantages, disadvantages or threats of a phenomenon are well communicated to the intended audience. In other words, when people realize the health advantages/ benefits of making lifestyle changes and the repercussions of not doing so, they are most likely to effect the changes.

This assertion is corroborated by the report of Masoudiyekta et.al (2018) who used the health belief model as a basis to conduct a quasi-experimental study on how education affects breast cancer screening in women in Iran. The authors reported that proper information dissemination concerning breast cancer, its risks, and its prevention led to positive attitudes toward breast cancer screening among the women. This present study assessed the impacts of the identified factors from the literature on the general health of staff and students at the All Saints University and strives to get the populace in Dominica informed on some positive changes that could improve health and wellness.

Research Purpose

The purpose of this research was to assess the nutritional choices, quality of sleep and physical activities of staff and students at the All Saints University School of Medicine and to investigate if these factors impact the general health of the people.

METHODOLOGY

This study utilized the quantitative approach. Quantitative research hinges on positivism (Pawlikowski et.al, 2018). A quantitative approach is chosen because it is objective, impartial, replicable, predictable and deterministic (Cohen et.al, 2011; Pawlikowski et.al, 2018). The entire staff and students of the All Saints University were targeted for the study. However, the survey was voluntary. Faculty staff, nonteaching staff, and students at the All Saints University School of Medicine, Dominica were eligible to participate in the study. Students who had graduated from the institution were excluded from the study.

After an approval letter was obtained from the Research Committee of the All Saints University, the link to the questionnaire was sent to the faculty staff and students through the office of the Academic Dean. The link was sent to the nonteaching staff through the office of the Registrar, Administration. The opening page of the questionnaire explained the purpose of the questionnaire. Participants were assured of their anonymity and confidentiality. There was a *CONSENT* button on the questionnaire that participants clicked for them to proceed. Those who were unwilling to participate in the study did not bother to click on the button.

Period of Research Study and Duration

This study was conducted during the 2022 winter semester after approval was obtained from the ASUSM Research Committee/ Research Ethics Committee. The surveys took about 30 minutes to complete. Participants were given a two-week period to answer the survey.

Research Instruments

The Nutritional Assessment instrument of the Government of Northwest Territories (Healthy Eating Assessment, 2017) was utilized to assess the nutritional choices of the participants. This instrument was adapted from the nutritional assessment instrument created by Paxton et.al (2011) and both instruments are in the public domain and allowed to be used for nutritional assessment studies. This instrument (Healthy Living Assessment, 2017) is rated on a Likert scale of 1 to 5. The highest possible score is 50 while the lowest is 10. Scores between 10 and 19 are poor and need improvement; scores between 20 and 29 are fair, scores between 30 and 39 are good while scores between 40 and 50 are excellent (Healthy Living Assessment,

2017). Based on their total scores, participants were grouped into four categories: Poor (Need improvement), Fair, Good and Excellent.

The Pittsburgh Sleep Quality Index (PSQI) instrument was used to determine the quality of sleep. This instrument was developed by Buysse *et.al* (1989) and is useful for both hospital practice and research purposes. It has 86.5% specificity ($\kappa=0.75$, $p<0.001$) (Buysse *et.al*, 1989). The PSQI is a validated instrument used worldwide. It has seven components which are: duration of sleep, sleep disturbance, sleep latency, day dysfunction due to sleepiness, sleep efficiency, overall sleep quality and needs for medications to sleep (Correa *et.al*, 2017; Zeek *et.al*, 2015). Based on the scoring results, participants were categorized as either having *Poor Quality of Sleep* or *Good Quality of Sleep*.

The International Physical Activity Questionnaire—Short Form (Booth, 2000) was utilized for the physical activity assessment. This instrument has been validated and used by many researchers for assessing physical activity of individuals (Lee *et.al*, 2011). Based on their scores, participants were categorized into three groups: *Low Activity Level*, *Moderate Activity Level*, and *High Activity Level*.

The SF-36 Questionnaire was utilized to assess the general health of the participants. This instrument has been reported to be widely used by researchers for similar studies (Lins & Carvalho, 2016). There are 36 questions and each question is rated between 0 and 100. Therefore, the highest overall score is 3600 while the lowest is 0. However, the percentage scores were used for the statistical analysis.

Data Collection

A survey method was utilized to extract information from the participants. Questionnaires have been found to be very useful in educational research, including medical education research (Artino Jr. *et.al*, 2014). Data were collected anonymously online through the Google Forms. All the instruments were pulled together in one survey and sent to the participants (staff and students). The survey had a demographic portion which captured academic School Status (Staff or Student), Gender, Program (if student)—Nursing, Premed or MD; Staff Status—Teaching Staff/ Nonteaching Staff. MD students were further categorized into Basic Medical and Clinical. The link to the survey was sent to participants through the Dean's office and the Administrative

Registrar's office. Responses of participants stored in the Google Forms were password-protected.

Data Analysis

Responses from participants were recorded into Microsoft Excel files and the data transferred into the Statistical Packages for Social Sciences (SPSS) files. The SPSS 28 software was utilized for both descriptive and inferential statistical analysis. Results from the data analysis were utilized to answer the research questions.

Descriptive statistics included means, percentages, tables and charts. Inferential statistical analysis involved testing the hypotheses through correlational tests, independent sample T-Tests, Mann-Whitney U tests, regression and ANOVA (analysis of variance). The alpha value was set at .05. If the *P* value was greater than .05, the null hypothesis was accepted. If the *P* value was equal to or less than .05, the null hypothesis was rejected and the alternative hypothesis was accepted.

Testing for Credibility

The credibility of this study was assessed via use of standardized instruments and testing for the assumptions of independent sample T-test, ANOVA and regression. The assumptions of the independent sample T-Test, ANOVA and regression were assessed through the multicollinearity tests and Levene's homoscedasticity tests. Likewise, the normality of the dependent variable (health status) was determined by histogram.

Statistical Analysis to Answer the Research Questions

Five research questions guided the operation of this study. The first research question was answered by the descriptive statistics of percentages, means and standard deviation while the other four research questions had a pair of hypotheses each that were tested.

Research Question 1: What are the nutritional choices, quality of sleep and physical activity status of staff and students at the All Saints University?

This research question was answered by the descriptive statistics of percentages, means and standard deviations.

Research Question 2: Is there any relationship between the nutritional choices of staff and students at the All Saints University and their general health?

Null Hypothesis (H_0): There is no statistically significant relationship between the nutritional choices of staff and students at the All Saints University and their general health.

Alternative Hypothesis (H_1): There is a statistically significant relationship between the nutritional choices of staff and students at the All Saints University and their general health.

This research question was answered by conducting a Spearman rank correlational test to assess any statistical relationship between nutritional choices and health status of participants.

Research Question 3: Is there any relationship between the quality of sleep of staff and students at the All Saints University and their general health?

H_0 : There is no statistically significant relationship between the quality of sleep of staff and students at the All Saints University and their general health.

H_1 : There is a statistically significant relationship between the quality of sleep of staff and students at the All Saints University and their general health.

This research question was answered by conducting a Spearman rank correlational test to assess any statistical relationship between quality of sleep and health status of participants.

Research Question 4: Is there any relationship between the physical activities of staff and students at the All Saints University and their general health?

H_0 : There is no statistically significant relationship between the physical activities of staff and students at the All Saints University and their general health.

H_1 : There is a statistically significant relationship between the physical activities of staff and students at the All Saints University and their general health.

This research question was answered by conducting a Spearman rank correlational test to assess any statistical relationship between physical activity and health status of participants

Research Question 5: Do nutritional choices, quality of sleep and physical activities predict the general health of staff and students in All Saints University?

H₀: Nutritional choices, quality of sleep and physical activities do not predict the general health of staff and students at the All Saints University.

H₁: Nutritional choices, quality of sleep and physical activities do predict the general health of staff and students at the All Saints University.

A linear regression analysis was conducted to assess any impacts of nutritional choices, quality of sleep and physical activity on the health status of the participants. The regression analysis determined the best predictor(s) of general health among the independent variables. Gender and Participant Status were used as controlling variables. Since these are nominal variables, they were first converted to dummy variables before they are used for the regression analysis. For Gender Dummy, Male = 0 while Female = 1. For Participant Status Dummy, Staff = 0 and Student = 1.

In addition, a Kruskal-Wallis Test was conducted to assess any statistical differences in the nutritional choices, quality of sleep and physical activities of student participants based on academic programs (Nursing, Premed, Basic Medical, & Clinical).

A Mann-Whitney U test was also conducted to assess any statistical difference in the nutritional choices, quality of sleep and physical activities of staff participants based on employment status (Teaching Staff & Nonteaching Staff) and gender (Male & Female).

ANOVA was utilized to assess any statistical difference in the general health of student participants based on academic programs (Nursing, Premed, Basic Medical, & Clinical). If the ANOVA test is positive, a Post-Hoc LSD (Least Significant Difference) shall be conducted.

An independent sample T-Test was conducted to test any statistical difference in the general health of male and female student participants.

Ethical Considerations

Approval was obtained from the All Saints University Research Committee/ Research Ethics Committee before the research was conducted. All participants' responses were kept confidential. No one was coerced, bribed or threatened to take part; each participant took part

voluntarily. The write-up was checked for plagiarism. All sourced information were properly cited and referenced.

Limitation

One limitation of this study is the fact that it used questionnaires and it is difficult to tell whether participants would be honest with their responses or not. However, since the survey was conducted anonymously and participants were assured of their anonymity and confidentiality, it was and is expected that they would be truthful.

Delimitation

This study was limited to students and staff at the All Saints University School of Medicine, Dominica. Students that had graduated from the university were excluded from the study.

RESULTS

This section describes the results obtained from the study and which are utilized to answer the research questions. There were a total of 77 participants; 63 were students while 14 were staff. Based on gender, there were a total of 44 female and 33 male participants.

The five research questions were answered through the results that are presented below.

Research Question 1: What are the nutritional choices, quality of sleep and physical activity status of staff and students at the All Saints University?

This research question was answered by the descriptive statistics of means, frequencies and percentages, as indicated in Table 1 below.

Table 1:

Summary of Nutritional Choices, Quality of Sleep, physical Activity and General Health of Participants

Variable		Frequency	Percentage	
Nutritional Choices	Poor	1	1.3	
	Fair	9	11.7	

	Good	62	80.5	
	Excellent	5	6.5	
	Total	77	100	
Sleep Quality	Poor	40	54.1	
	Good	34	45.9	
	Total	74	100	
Physical Activity	Low	39	51.3	
	Moderate	27	35.5	
	High	10	13.2	
	Total	76	100	
General Health		(M=75.46, SD=15.44)	75.46	

From the Table above, it can be seen that 1 participant (1.3%) had poor choices, 9 (11.7%) had fair choices, 62 (80.5%) had good choices while 5 participants (6.5%) had excellent nutritional choices. It can be seen that 40 participants (54.1%) had poor sleep quality while 34 participants (45.9%) had good sleep quality.

It can also be seen that 39 participants (51.3%) had low physical activity, 27 participants (35.5%) had moderate physical activity while 10 participants (13.2%) had high physical activity.

The overall general health of participants was 75.46% (M=75.46, SD=15.44).

Research Questions 2 to 4: These questions were answered by testing the hypotheses presented in the Methodology section, using the Spearman Rank correlational analysis. The summary of the results is presented in Table 2 below.

Table 2:

Summary of Correlational Analysis to Answer Research Questions 2-4

Variable	Sample Size (independent Variable)	Sample Size (Dependent Variable)	Correlation Coefficient (r)	P Value (- Tailed)
----------	--	--	-----------------------------------	-----------------------

Variable	Sample Size (independent Variable)	Sample Size (Dependent Variable)	Correlation Coefficient (r)	P Value (- Tailed)
Nutritional Choices	77	77	.270	.018
Quality of Sleep	74	77	.387	<.001
Physical Activity	76	77	.237	.040

Table 2 above shows that each of the three independent variables exhibited positive and statistically significant ($P < .05$) correlation with general health of participants.

Research Question 5. A regression analysis was run to answer the fifth research question. The impact of nutritional choices, quality of sleep and physical activity on the general health was determined, using gender and participant status as controlling variables.

Statistical analysis showed that the correlations between the independent variables were much less than 0.8. This signifies that there was no multicollinearity between them (Daoud, 2017). To further test for the multicollinearity, tolerance and variance inflation factor (VIF) were determined. The tolerance values were greater than 0.10 and the VIF values were less than 10. This indicated that there was no multicollinearity (Daoud, 2017, Hair et.al, 2010). The histogram of regression standardized residual showed a normal distribution curve and the normal P-P plot also showed near linearity.

Figure 1 shows the normality of the regression standardized residual for the dependent variable, general health.

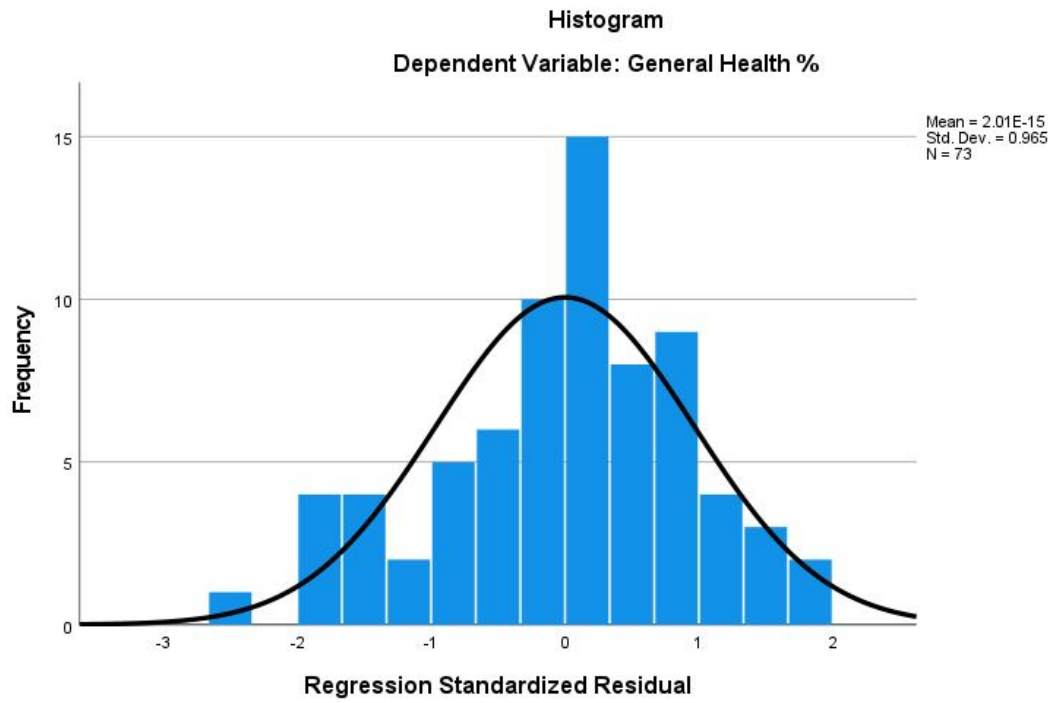


Figure 1:

Regression Standardized Residual

The Normal-PP plot for regression residual was determined and the result is shown in the figure below.

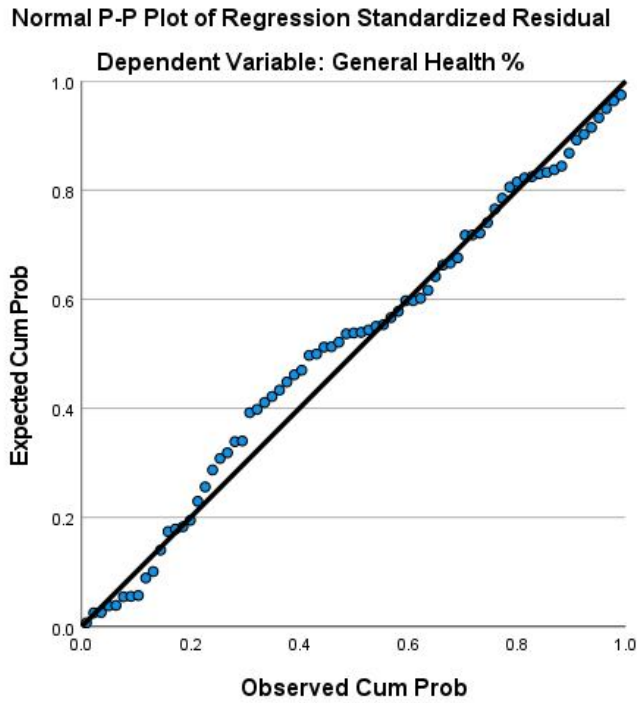


Figure 2:

Normal P-P Plot of Regression Standardized Residual

The test results shown above indicate that the assumptions of regression were not violated.

Table 3 below indicated the summary of the regression results.

Table 3:

Summary of Multiple Regression Results

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.621 ^a	.385	.340	12.54256	.385	8.405	5	67	<.001

a. Predictors: (Constant), Physical Activity, Quality of Sleep, Participaant Dummy, Nutritional Choices, Gender Dummy

b. Dependent Variable: General Health %

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6610.838	5	1322.168	8.405	<.001 ^b
	Residual	10540.163	67	157.316		
	Total	17151.001	72			

a. Dependent Variable: General Health %

b. Predictors: (Constant), Physical Activity, Quality of Sleep, Participaant Dummy, Nutritional Choices, Gender Dummy

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	24.487	11.998		2.041	.045	.539	48.434					
	Participaant Dummy	-4.203	3.845	-.108	-1.093	.278	-11.878	3.472	-.245	-.132	-.105	.940	1.063
	Gender Dummy	-5.326	3.061	-.173	-1.740	.086	-11.436	.784	-.155	-.208	-.167	.928	1.077
	Nutritional Choices	10.352	3.157	.323	3.279	.002	4.050	16.655	.338	.372	.314	.947	1.056
	Quality of Sleep	13.881	3.038	.452	4.570	<.001	7.818	19.944	.389	.487	.438	.939	1.065
	Physical Activity	4.099	2.171	.186	1.888	.063	-.233	8.431	.255	.225	.181	.941	1.063

a. Dependent Variable: General Health %

Table 3 above shows an R Square of .385 and an adjusted R Square of .340. R square depicts the proportion of variance of general health that is determined by the independent factors in the sample while the Adjusted R Square denotes the estimated proportion in the population. Since the R Square value is .385, this indicates that 38.5% of the general health of participants can be accounted for by the independent factors.

The results of the regression indicated that the model explained 38.5% of the variance and that the model was a significant predictor of general health, $F(5, 67) = 8.405$ $p < .001$. While Nutritional Choices ($B = 10.352$, $p = 0.002$) and Quality of Sleep ($B = 13.881$, $p < .001$) contributed significantly to the model, Physical Activity ($B = 4.099$, $p = .063$), Gender ($B = -5.326$, $p = .086$) and Participant Status ($B = -4.203$, $p = .278$) did not.

The regression analysis resulted in the following equation specification:

$$\text{General Health} = 24.487 + (10.352 * \text{Nutritional Choices}) + (13.881 * \text{Quality of Sleep}) + (4.099 * \text{Physical Activity}) - (5.326 * \text{Gender}) - (4.203 * \text{Participant Status}).$$

Since 0 is given for Male in the Gender Dummy variable and 1 to Female, Male is the reference for gender. Therefore, female participants would have 5.326 less than males as a contribution of gender to the general health. In a like manner, Participant Status Dummy variable has 0 for Staff and 1 for Student. Therefore, the student has 4.203 less than staff as contribution of participant status to the general health. The equation was statistically significant at the $< .001$ level as indicated by the F value of 8.405. The t -statistics was used in the selection of the statistically significant variables.

This equation suggests that nutritional choices and quality of sleep were the most significant predictors of general health. Physical activity has a P value that is greater than .05; therefore it is not a good predictor of general health in this study. The demographic variables of gender and participant status are also not good predictors of general health since they are not statistically significant.

Results of the Other Statistical Tests

An independent sample T-test indicated that staff participants had a higher mean general health ($M = 83.13$, $SD = 11.93$) than student participants ($M = 73.75$, $SD = 15.69$) and this

difference is statistically significant ($P = .039$). A T-test analysis also indicated that the male participants had a higher mean general health ($M = 78.05$, $SD = 14.97$) than the female participants ($M = 73.51$, $SD = 15.67$); however, the difference is not statistically significant ($P > .05$).

A Mann-Whitney U test showed that staff participants had higher mean ranks in quality of sleep, nutritional choices and physical activity compared to the students, but the differences were not statistically significant ($P > .05$). A Mann-Whitney U test also indicated that there were no statistically significant differences in the mean ranks of participants in quality of sleep, nutritional choices and physical activities based on gender ($P > .05$).

DISCUSSION

This study provides answers to the six research questions which were the benchmarks that guided the research. How these findings relate to the literature is also discussed.

Research Question 1. The first research question asked about the nutritional choices, quality of sleep, physical activity and general health of the students and staff of the All Saints University. Majority of participants (54.1%) had poor sleep quality while only 45.9% had good sleep quality. This is worrisome and needs to be addressed. Likewise, majority of participants (51.3%) had low physical activity while 35.5% had moderate physical activity and 13.2% had high physical activity. This also needs to be addressed.

However, there are differences in these mean scores based on gender and participant status. For example, the mean general health of male participants ($M = 78.05$, $SD = 14.973$) is higher than that of females ($M = 73.51$, $SD = 15.674$) though the difference is not statistically significant. Likewise, the general health of staff participants ($M = 83.13$, $SD = 11.939$) is higher than that of student participants ($M = 73.72$, $SD = 15.693$) and the difference is statistically significant.

Research Questions 2-4. The second, third and fourth research questions tested any correlational relationships between the independent variables of nutritional choices, quality of sleep and physical activity, and the dependent variable of general health. As indicated in Table

2, Nutritional Choices ($r = .270$, $p = .018$), Quality of Sleep ($r = .387$, $p < .001$) and Physical Activity ($r = .237$, $p = .040$) all have positive correlations with general health and these correlations are statistically significant. Additional analysis shows that males had a better mean general health score than the females though the difference is not statistically significant. The staff participants also had a better mean general health score compared with student participants, and the difference is statistically significant. Staff participants have higher mean scores in quality of sleep, nutritional choices and physical activity, compared to the student participants, though the differences are not statistically significant ($P > .05$). The male participants had a higher mean scores in nutritional choices and physical activity compared to females while the females have a higher mean scores in quality of sleep; however, these differences were not statistically significant. From the results and the literature, the following syntheses are made:

Nutritional Choices and General Health

In terms of the nutritional choices, our findings showed a statistically significant correlation to the general health of the study participants. This finding echoes the results of similar studies that were done by other researchers. Studies by Wright et al. (2015) examined the association of nutrition behavior with the obesity levels in Caribbean undergraduate students and found a correlation in avoidance of healthy food choices with the high prevalence of obesity amongst these students ($P < 0.05$ for all variables considered). From a randomized controlled intervention done in Trinidad, it may be safe to say that poor nutritional habits begin very early (Francis et al., 2010). Food consumption patterns and the evidence of obesity at such young ages were concerning signs. It also highlighted that education relating to the best eating choices were not sufficient to have students foster a better lifestyle as the home environment remained pivotal in their overall choices.

Examining the nutritional choices of students by the different programs offered by the university, the study observed that this variable was not statistically significant. This is in contrast to studies like Gacek (2020), which discovered that female Polish students studying Medicine rather than other technical fields generally made healthier nutritional choices. However, it must be noted that students at the All Saints University are studying similarly related courses (Medicine & Nursing) and this might explain why there are no significant differences in

their nutritional choices as the importance of good nutrition is being stressed to both medical and nursing students.

Studies by Kyrkou et al (2018) in Greece highlight the same findings of a gender-specific difference in nutritional choices with females having more tendency to adopt portion control and dieting to stay healthy and control weight. Findings from a study done by Bede et al. (2020) in Cameroon among 3 universities showed that poor eating habits such as snacking topped the bracket for the larger percentage of students. Skipped meals was a custom and only 33.5% had three daily meals. Malnutrition per gender was significant in which case the BMI (29.5 as index) appeared generally higher for females than males ($P = 0.026$). Our findings show that the males have a higher mean score for nutritional choices compared to the female participants, though this difference is not statistically significant. The difference might be due to contextual variations. However, further research might be conducted to explore the various factors that could also contribute to this observation.

Sleep Quality and General Health

Our study agrees with studies from other parts of the world that good sleep is associated with good health. Clement-Carbonell *et al* (2021) reported a significant association between sleep quality and both physical and mental health. Dalmases *et al*, (2019) affirmed that improved sleep health was associated with improved health status.

In the study conducted by Matsui et.al (2021), an explicit link is seen between the quality of sleep, duration of sleep, and the mental and physical wellbeing of the participants, using the Pittsburgh Sleep Quality Index (PSQI) and Short Form-8 (SF-8) to measure sleep quality & duration, and physical quality of life respectively. Their research findings showed a strong association between the quality of sleep and general quality of life (QOL) in contrast to the duration of sleep, which showed a weaker correlation to the participants' QOL and general health, although a shorter sleep duration was linked to worse mental health in particular.

According to the findings of this study, sleep quality was strongly connected with both physical and mental health, whereas sleep duration was mainly linked with the mental aspect of QOL.

Seun-Fadipe et al.(2017) conducted a study in the University of Ile-Ife to evaluate undergraduate students' sleep quality. Their results revealed that half of the student participants reported poor quality of sleep alongside the presence of anxiety, depression and psychological distress. Concerning demographic variables, the participants' year of study and the aforementioned markers of poor mental health showed a strong relationship with sleep quality. This further bolsters the considerable correlation between general health, in this case, the mental aspect of it, and sleep quality.

Carpi et al.(2022) carried out a study centered on the university students of Sapienza University of Rome, one of Italy's largest universities. According to the PSQI, up to 65% of the sample had poor sleep quality, with 55% of participants reporting pertinent insomnia symptoms. Similarly to our study, there were no significant connections discovered between gender and poor sleep in their investigation, despite females obtaining a higher mean score on the PSQI correlating to poorer sleep quality. Individuals with poor sleep quality had lower physical and mental health-related quality of life. They concluded that their study found a substantial connection between the key elements of sleep quality and physical and mental health-related quality of life. While our results show the overall quality of sleep of participants, we plan to investigate how each sleep quality component has affected the general health of participants in our later study.

Barros et.al (2019) carried out a study on how prevalent poor sleep was among population subgroups in Brazil. They reported that poor self-rated sleep was significantly higher in females compared to males. However, our study shows that female participants have a higher mean rank (40.35) in sleep quality compared to males (33.95) though this difference is not

statistically significant ($P = .141$). The observed differences in our study and that of Barros et.al (2019) could be due to geographical and contextual variations.

Physical Activity and General Health

On analysis of our study, a positive relationship exists between physical exercise and general health of participants. Although other factors like nutritional choices and quality of sleep at a more positive association with general health, the role of physical exercise however could not be underestimated. Physical exercise in most people results in positive emotions which could equally enhance the functioning of the immune system thus leading to better general and even cardiovascular health (Kim & McKenzie, 2014). Kim & McKenzie, (2014) carried out a phenomenological research at Southern Illinois University where the impact of physical exercise on psychological well-being was analyzed. Their study also showed that the discipline that comes from physical exercise could also be reflected in other health practices hence individuals who carry out physical exercise tend to promote other healthy behaviors hence physical exercise could lead to better general health practices like nutrition and quality of sleep.

Snedden et al. (2019) carried out a study amongst undergraduate student-athletes and non-athletes in a large Midwestern University. Two components were used for the measurement of health in this study; a physical component score (PCS) and a mental component score MCS. The study reported a higher PCS score in general students who worked out more which the authors attributed to positive physical health. MCS increased with an increase in physical activity in both non-athlete and athlete students irrespective of the specific type of sports activities or sports games the athletes played. Non-athlete students who participated in some form of team sports equally recorded higher MCS. However, student-athletes recorded the highest MCS. Students who recorded low activity were found to have lower MCS. This finding led to Snedden et al. (2019) concluding that participation in any form of physical activity will lead to a generalized improvement in overall health.

A study was done in New Delhi, India to assess the association between physical activity and quality of sleep on mental health amongst college students from different departments of Jamia Millia Islamia New Delhi, India. HADS (Hospital Anxiety and Depression

Scale) was used to measure the presence and severity of anxiety and depression. IPAQ-SF was used to measure physical activity.

There was a significant and inverse relationship between physical activity and anxiety (Ghrouz et al., 2019). In this study, participants who recorded a moderate level of physical activity were 6.45 times less likely to have anxiety per one unit increase in the physical activity score in comparison with students who recorded low levels of physical activity. While in comparison to students who recorded low physical activity, students with a high level of physical activity were up to 10.42 times more likely to have low anxiety levels per one unit increase in physical activity score.

Ghrouz et al., (2019) Also reported an inverse relationship between physical activity and depression, with students who recorded a moderate level of physical activity 8.93 times more likely not to have depression per one unit increase in PE when compared with those of low-level PE. The same odds for anxiety applied to depression when it came to the students with high levels of physical exercise.

Physical activity has a positive association with mental health irrespective of the intensity of the exercise. There was equally an inverse relationship between physical exercise and anxiety or depression (Ghrouz et al., 2019). Furthermore, physical exercise improves positive emotion and hence can become therapeutic in the management of psychological and mental health complaints like anxiety and depression (Ghrouz et al., 2019).

Wright et al (2015) studied the association of nutritional behaviors and physical activity on the general and central obesity in Caribbean undergraduate students. They conducted a study to evaluate the association of nutritional behaviors and physical activity with general obesity. The study included undergraduate students from Barbados, Jamaica, and Grenada. In this study, the International Physical Activity Questionnaire (IPAQ) short form was used to analyze the amount of physical activity done by students. Met scores were calculated and used in categorizing students into groups of vigorous, moderate, and low activity. This study showed about 46% of females and 24% of males recorded low levels of physical activity. Though the authors did not establish any significant relationship between nutritional choices and physical activity, their study was relevant due to the risk of cardiovascular disease that is associated with low levels of physical activity Wright et.al (2015).

Steineke (2019) in his study showed results do match the expectations that physical exercise is related positively to general health. One of the purposes of the study was to find out the association between physical activity and the improvement of general health. According to his study done at the University of South Dakota, both the hypothesized relationships between physical activity with overall health ($F[1,89]=32.40, p<.001$) and mental health ($F[1,88] =5.32, p=.02$), were supported by the data. Physical activity accounted for 27% of the variance in overall health and 6% of the variance in mental health, (Steineke, 2019). Another study done at University in Ukraine showed the correlation analysis defined an authentic interrelation ($p<0.05$) between the students' physical fitness level and the indicators of their health (Prontenko, 2017).

Research Question5: Regression Model

The fifth research question used a regression analysis to investigate any impacts of quality of sleep, nutritional choices and physical activity on the general health of participants, using gender and participant status as controlling variables. This study has shown that while quality of sleep, nutritional choices and physical activity all have positive and significant correlations with general health, the best predictors of general health are quality of sleep and nutritional choices.

The regression equation is:

$$\text{General Health} = 24.487 + (10.352 * \text{Nutritional Choices}) + (13.881 * \text{Quality of Sleep}) + (4.099 * \text{Physical Activity}) - (5.326 * \text{Gender}) - (4.203 * \text{Participant Status}).$$

This study buttresses earlier reports on the impacts of quality of sleep and nutritional choices on the general health of people. Though not statistically significant, Physical Activity's contribution in regression is still positive and this shows that physical activity may contribute to the general health though the impact may not be as strong as those of quality of sleep and nutritional choices. Gender and Participant Status did not contribute significantly to the regression; however, they still add to the regression equation. Male and Staff were assigned 0

values in the Dummy Nominal variables of Gender and Participant Status, respectively, while Female and Student were assigned 1; it shows that, all other things being equal, being a female and being a student would give a lower general health score compared to being a male and being staff, respectively.

CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

Conclusion

This study has demonstrated that quality of sleep and nutritional choices are the best predictors of general health at the All Saints University School of Medicine, Dominica. The study also indicated that Physical Activity has a positive significant correlation with general health and also contributes positively (though non-significantly) to general health in the regression model. Males appeared to have a mean better general health compared to the females though the difference is not statistically significant. Likewise, staff had better and statistically significant mean general health compared to the students. The mean general health of students below the age of 20 years was significantly lower than those of students between the ages of 20 and 39 years. There were also differences in nutritional choices, quality of sleep, physical activity and general health of students based on their academic programs. However, the general health, quality of sleep, nutritional choices and physical activities of staff showed no statistical differences between staff groups (Academic Staff versus Nonteaching Staff). These findings have both practical and theoretical implications, and would assist policy makers in making decisions and policies that would assist people to promote their general health.

Implications of the Study

Practical Implications

This study has provided a new empirical evidence that nutritional choices and quality of sleep are good predictors of general health of people. The study also showed that majority of participants had poor quality of sleep and low physical activity. These need to be addressed. However, only 13% of participants had poor/fair nutritional choices while 87% had either excellent or good nutritional choices. The study also reinforced previous reports that physical activity, quality of sleep and nutritional choices have positive associations with general health. These findings would assist institutional administration to draw up policies and advices that could be useful in educating students on how to enhance quality living. This is especially important in Caribbean medical schools where studies of this nature are not very common.

The study shows that the general health of staff is significantly better than that of students. Likewise, the staff have better scores (though not significant) in quality of sleep, nutritional choices and physical activity when compared with the students. This needs to be looked into. The students might have less time to cook and thereby resulting in buying not-so-healthy snacks. The same could also be true of students having much less time for sleep because they usually face a lot of pressure academically (Correa et.al, 2017). However, with proper education and counseling, the students can be shown how to utilize their time optimally and how to engage in healthier nutritional practices.

Theoretical Implications

This research has contributed to knowledge in many ways. Earlier studies have shown that quality of sleep, nutritional choices and physical activity have positive correlations with general health. Our study also confirmed these observations. This study also demonstrated that quality of sleep and nutritional choices are the best predictors of general health while physical activity contributed positively but non-significantly to the general health.

While Barros et.al (2019) reported that females had a significant poorer quality of sleep compared to males, our study showed that the females had a better mean quality of sleep than the males though the difference was not statistically significant. While Kyrkou et al (2018) reported that females had better nutritional choices compared to males, our results show that the

males have better (though not statistically significant) nutritional choices compared to the females. The differences could be due to contextual differences.

This study would hopefully spur more researches in this area in other educational institutions, especially in the Caribbean.

Strengths and Weaknesses of the Research

This study draws its strengths from the positivist research approach which is objective, impartial and deterministic. In addition, standardized instruments were used for the survey. The assumptions of the inferential statistical analysis were tested to ensure the credibility and robustness of the study.

One weakness of the study is the sample size. To overcome this, the entire student and staff population was sampled for the study and this enhanced good representation. Another weakness is the fact that any health condition that participants might have that might actually affect their nutritional choices, sleep and physical activity was not considered. For instance, persons with debilitating conditions may not be able to participate in physical activity and this could constitute a confounding variable. However, since the participants were drawn from a University where the students participated in academic programs and staff came to work without any complaints, it is assumed that the confounding variables if any, would not have much effects on the results. Nonetheless, in future research, people with chronic health issues may not be included in the study.

Recommendations

Recommendations for Practice and Policy

1. Students and staff should be encouraged to prioritize sleep and observe better sleep practices. If they cannot make up the recommended seven hours of uninterrupted sleep at nights, they should strive to have at least six hours of uninterrupted night sleeps.
2. Students and staff should endeavor to have siestas during the day.
3. In situations where several days are spent with not-enough sleep, increased hours of sleep should be observed at least for a day during the weekend, without an alarm clock, to make up for minimal sleep during the week.

4. Fruits should be provided at the student lounge once a week to encourage students have similar practices at home.
5. Students should be educated more on the need to consume healthy foods and snacks
6. The University should re-open the cafeteria. Healthy foods and snacks should be served in the cafeteria to encourage students practice better nutritional choices.
7. Students should be advised to limit the consumption of not-so-healthy foods such as carbonated drinks, energy drinks, caffeinated drinks and foods rich in trans-fats.
8. Students should be educated on the proper timing for food consumption, as late hour heavy meals could also cause unpleasant reactions.
9. The University should organize fitness activities as part of its extracurricular events.
10. Students should be educated to increase their daily physical activities either by carrying out specific workout routines or by walking and stretching between study periods.
11. The establishment of a Fitness Club at the University is recommended.

Recommendations for Future Research

1. Future research may consider taking the blood pressure, blood glucose and body mass index of participants and determining how the independent factors of quality of sleep, nutritional choices and physical activities affect these parameters.
2. This study should be replicated in other institutions in Dominica, such as governmental ministries, educational institutions and religious organizations.
3. Similar research studies should also be conducted in other Caribbean medical schools for comparison.
4. A qualitative research that involves interviews and open-ended questionnaire can be conducted with selected participants from different demographic subgroups. This would help to get more detailed insights into how the independent variables affect the general health of people. This is especially important due to the fact that poor nutrition, for instance, has been linked to obesity and other health conditions among young people and undergraduates in the Caribbean (Francis et.al, 2010; Wright et.al, 2015).

References

- Artino Jr., A.R., La Rochelle, J.S., Dezee, K.J., & Gehlbach, H. (2014). Developing questionnaires for educational research: AMEE Guide No. 87. *Medical Teacher*, 36(6), 463-474.
<https://doi.org/10.3109/0142159X.2014.889814>
- Barros, M.B.A., Lima, M.G., Ceolim, M.F., Zancanella, E., & Cardoso, T.A.M. (2019). Quality of sleep, health and well-being in a population-based study. *Rev Saude Publica*, 53, 82-93.
- Bede, F., Cumber, S.N., Nkfusai, C.N., Venyuy, M.A., Ijang, Y.P., Wepngong, E.N., & Kien, A.T.N. (2020). Dietary habits and nutritional status of medical school students: the case of three universities in Cameroon. *Pan African Medical Journal*, 35, 15-24.
doi:10.11604/pamj.2020.35.15.18818
- Booth, M.L. (2000). Assessment of physical activity: An international perspective. *Research Quarterly for Exercise and Sport*, 71(2), 114-120.
- Buysse, D.J., Reynolds, C.F., Monk, T.H., Berman, S.R., & Kupfer, D.J. (1989). Pittsburgh sleep quality index: a new instrument for psychiatric practice and research. *Psychiatry Research*, 28, 193-213.
- Carpi M, Cianfarani C, Vestri A. Sleep Quality and Its Associations with Physical and Mental Health-Related Quality of Life among University Students: A Cross-Sectional Study. *International Journal of Environmental Research and Public Health*. 2022 Mar 1;19(5):2874.
- Clement-Carbonell, V., Portilla-Tamarit, I., Rubio-Aparicio, M., & Madrid-Valero, J.J. (2021). Sleep Quality, Mental and Physical Health: A Differential Relationship. *Int. J. Environ. Res. Public Health*, 18, 460.
- Cohen, L., Manion, L., & Morrison, K. (2011). *Research Methods in Education* (7th ed.). Routledge.

- Correa, C., Oliveira, K., Pizzamiglio, D.S., Ortolan, E.V.P., & Weber, S.A.T. (2017). Sleep quality in medical students: a comparison across the various phases of the medical course. *The Journal Brasileiro de Pneumologia*, 43(4), 285-289. <http://dx.doi.org/10.1590/s1806-37562016000000178>
- Dalmases, M. , Benítez, I., Sapiña-Beltran, E., Garcia-Codina, O. , Medina-Bustos, A. , Escarrabill, J., Esteve Saltó, Buysse, D.J., Plana, R.E., Sánchez-de-la-Torre, M., Barbé, F., & de Batlle, J. (2019). Impact of sleep health on self-perceived health status. *Scientific Reports*. 9 (1): 7284. doi:10.1038/s41598-019-43873-5.
- Daoud, J.I. (2017). Multicollinearity and regression analysis. *Journal of Physics: Conference Series*, 949, 1.6. doi :10.1088/1742-6596/949/1/012009
- Francis, M., Nichols, S.D., & Dalrymple, N. (2010). The effects of a school-based intervention programme on dietary intakes and physical activity among primary-school children in Trinidad and Tobago. *Public Health Nutrition*, 13(5), 738-747. doi:10.1017/S1368980010000182
- Gacek, M. (2020). Physical activity and nutritional behaviours of female Cracow students of medical and technical fields of study. *Hygeia Public Health*, 55(1), 21-26. <http://www.h-ph.pl/pdf/hyg-2020/hyg-2020-1-021.pdf>
- Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010). *Multivariate Data Analysis*. (7th Eds.). Prentice Hall, Upper Saddle River, New Jersey.
- Healthy Eating Assessment (2017 January). Government of Northwest Territories. <https://www.hss.gov.nt.ca/sites/hss/files/resources/healthy-eating-assessment.pdf>
- Holdsworth, M.A. (2019). Health, wellness and wellbeing. *Revue Interventions Economiques*, 62, 1-15, <https://doi.org/10.4000/interventionseconomiques.6322>
- Jones, C.L., Jensen, J.D., Scherr, C.L., Brown, N.R., Christy, K., & Weaver, J. (2015). The health belief model as an explanatory framework in communication research: exploring parallel, serial, and moderated mediation. *Health Communication*, 30(6), 566-576. doi: [10.1080/10410236.2013.873363](https://doi.org/10.1080/10410236.2013.873363)

- Kyrkou, C., Tsakoumaki, F., Fotiou, M., Dimitropoulou, A., Symeonidou, M., Menexes, G., Biliaderis, C.G., & Michaelidou, A. (2018). Changing trends in nutritional behavior among university students in Greece, between 2006 and 2016. *Nutrients*, *10*, 64. doi:10.3390/nu10010064
- Lee, P.H., Macfarlane, D.J., Lam, T.H., & Stewart, S.M. (2011). Validity of the international physical activity questionnaire short form (IPAQ-SF): A systematic review. *International Journal of Behavioural Nutrition and Physical Activity*, *8*(115), 1-11. <https://doi.org/10.1186/1479-5868-8-115>
- Lins, L., & Carvalho, F. M. (2016). SF-36 total score as a single measure of health-related quality of life: Scoping review. *SAGE Open Medicine*, *4*, 2050312116671725. <https://doi.org/10.1177/2050312116671725>
- Masoudiyekta, L., Rezaei-Bayatiyani, H., Dashtbozorgi, B., Gheibizadeh, M., Malehi, A.S., & Moradi, M. (2018). Effect of education based on health belief model on the behavior of breast cancer screening in women. *Asia-Pacific Journal of Oncology Nursing*, *5*(1), 114-120. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5763428/>
- Matsui K, Yoshiike T, Nagao K, Utsumi T, Tsuru A, Otsuki R, et al. Association of Subjective Quality and Quantity of Sleep with Quality of Life among a General Population. *International Journal of Environmental Research and Public Health*. 2021 Dec 6;18(23):12835.
- Medic, G., Wille, M., & Hemels, M.E.H. (2017). Short- and long-term health consequences of sleep disruption. *Nature and Science of Sleep*, *9*, 151-161. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5449130/>
- Mohamad, M.M., Sulaiman, N.L., Sern, L.C., & Salleh, K.M. (2015). Measuring the validity and reliability of research instruments. *Procedia-Social and Behavioral Sciences*, *204*, 164-171.
- Moreno, L.A., Gottrand, F., Huybrechts, I, Ruiz, J.R., Gonzalez-Gross, M. & DeHenauw, S. (2014). Nutrition and lifestyle in European adolescents: the HELENA (Healthy Lifestyle in Europe by Nutrition in Adolescence) study. *Advances in Nutrition*, *5*(5), 615-623. <https://pubmed.ncbi.nlm.nih.gov/25469407/>
- Pawlikowski, P., Rico, N., & Sell, S.L.V. (2018). Positivism: a concept analysis. *International Journal of Nurses & Clinical Practices*, *5*, 1-5.

- Paxton, A.E., Strycker, L.A., Toobert, D.J., Ammerman, A.S., & Glasgow, R.E. (2011). Starting the conversation performance of a brief dietary assessment and intervention tool for health professionals. *American Journal of Preventive Medicine*, 40(1), 67-71. DOI: [10.1016/j.amepre.2010.10.009](https://doi.org/10.1016/j.amepre.2010.10.009)
- Rosi, A., Paoletta, G., Biasini, B., & Scazzina, F. (2019). Dietary habits of adolescence living in North America, Europe or Oceania: a review on fruit, vegetable and legume consumption, sodium intake, and adherence to the Mediterranean diet. *Nutrition, Metabolism and Cardiovascular Diseases*, 29(6), 544-560. <https://pubmed.ncbi.nlm.nih.gov/31078365/>
- Seun-Fadipe CT, Mosaku KS. Sleep quality and psychological distress among undergraduate students of a Nigerian university. *Sleep Health*. 2017 Jun;3(3):190–4.
- Teijlingen, E.R.V., & Hundley, V. (2002). The importance of pilot studies. *Nursing Standard*, 16(40), 33-36. DOI: [10.7748/ns2002.06.16.40.33.c3214](https://doi.org/10.7748/ns2002.06.16.40.33.c3214)
- Viner, R.M., & Barker, M. (2005). Young people's health: the need for action. *BMJ*, 330, 901-903. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC556170/pdf/bmj33000901.pdf>
- Warburn, D.E.R., Nicol, C.W., & Bredin, S.S.D. (2006). Health benefits of physical activity: the evidence. *Canadian Medical Association Journal*, 174(6), 801-809. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1402378/>
- Wright, M., Adair, L., James, C., Amuleru-Marshall, O., Peltzer, K., Pengpid, S., & Samuels, T.A. (2015). The association of nutrition behaviors and physical activity with general and central obesity in Caribbean undergraduate students. *Rev Panam Salud Publica*, 38(4), 278-285.
- Zeek, M.L., Savoie, M.J., Song, M., Kennemur, L.M., Qian, J., Jungnickel, P.W., & Westrick, S.C. (2015). Sleep duration and academic performance among student pharmacists. *American Journal of Pharmaceutical Education*, 79(5), 1-8. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4571043/pdf/ajpe79563.pdf>

UNDER PEER REVIEW