BMI and Attitude as Predictors of Academic Performance of Level 1 Medical Students of the AUP College of Medicine

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ABSTRACT

This study determines the relationships between Body Mass Index (BMI), student attitude, and academic performance as measured by Grade Point Average (GPA) among Level 1 students at the Adventist University of the Philippines – College of Medicine. Forty-seven participants, a total enumeration of students enrolled, was used to ascertain the extent to which BMI and attitude individually affect academic outcomes. Data were collected through a survey, which included questions on students' attitudes, a records review of the GPA, and anthropometric measures for BMI calculation. Using correlation analysis, the study found no significant relationship between BMI and GPA, indicating a very weak but negative correlation. This means that the GPA tends to decrease for every increase in BMI. On the other hand, the relationship between attitude and GPA turned very weak and negative, with almost no correlation. While statistics failed to reveal a distinct relationship between BMI, attitude, and GPA, it is important not to dismiss the clinical and practical significance of BMI and attitude in the overall health and well-being of students. These must encourage students to have optimum health by continuing the implementation of lifestyle medicine-related programs. Furthermore, faculty members must be encouraged to actively engage with the medical students to reinforce positive attitudes of physicians as they serve as role models.

Keywords: Body Mass Index (BMI), Attitude, Grade Point Average (GPA), Medical Students

INTRODUCTION

Pursuing quality and effective medical education entails numerous factors that contribute to the success of the medical students' academic performance. Two factors that have gained particular attention are the body mass index (BMI) and attitude.

Currently, the AUP College of Medicine stands out as the only medical school that integrates Lifestyle Medicine into its medical curriculum. The college also emphasizes becoming physician missionaries, of which, attitude is of paramount importance alongside academic performance.

Using BMI as a relatively inexpensive and quick screening tool and measuring attitude using the predefined expectations and outcomes set by the AUP-COM establishes a strong foundation for investigating this area of interest. Therefore, exploring the relationship of factors potentially affecting medical students' academic performance, namely BMI and attitude, becomes warranted.

Additionally, minimal studies currently available globally dwell in these topic areas, and probably locally, within the level and scope of medical schools. Thus, this study was conducted to understand the interplay between BMI and attitude as predictors of their academic performance. The result could help improve the current MD program the university provides.

LITERATURE REVIEW

BMI and GPA

An individual's health status is a significant indicator in daily life endeavors including academic achievements. Body mass index (BMI) is an indicator to detect weight category and is known to influence the academic achievements of students (Amani Alhazmi et al., 2021). In a cross-sectional study done by Amani Alhazmi et al (2021), they found out that the overall academic performance was significantly negatively correlated with BMI among the students in different health specialties of King Khaled University, KSA. The participants with normal BMI also significantly attained higher GPA, however, those with low GPA were significantly correlated with high BMI.

Ishihara et al (2020) in a 2-year longitudinal study among Japanese children showed that weight gain with underweight and weight loss in children with overweight/obesity could improve their academic performance. Likewise, a cross-sectional survey done by Maram Livermore et al (2020) among English/French grade 9–12 students, overweight BMIs were predictive of lower achievement in females for English/French grades, and in males for math grades, relative to "normal-weight" BMIs.

Furthermore, a pilot study done by Hermassi et al (2021) among schoolchild handball players in Qatar showed that the normal weight group had the highest academic performance level. In contrast, the overweight group showed the lowest level in all academic performance parameters.

However, in a meta-analysis conducted by Jinbo He et al. (2019), a weak negative correlation between BMI and academic achievement was revealed. This is supported by a descriptive analysis done by Agu et al (2019) among medical students of Igbos of Nigeria concluded that there was no significant correlation between the indices of obesity (BMI and waist and hip circumferences) and academic performance of the students.

Also, the study of Mendoza-Castejón et al (2020) in their descriptive and non-experimental research based in quantitative data analyzed physiological stress markers, extracurricular physical activity, body mass index, and academic performance in school students showed no correlation between autonomic profile, physical activity, and body composition with objective academic performance was found. Nevertheless, subjective academic performance perception of teachers presented a negative correlation with body composition and the parasympathetic modulation.

Finally, Rena C. Moon (2020) in a longitudinal study of a nationally representative sample of 18,174 children who were enrolled in kindergarten in 2010 in the United States (ECLS-K:2011) examined the associations between childhood obesity, academic performance, and perception of teachers from kindergarten to fifth grade. In the crude analyses, obesity was negatively associated with achieving above-median reading and mathematics scores.

Attitude and GPA

R. Ortiz-Moya's (2019) study survey on the academic performance of students at the Central University Of Ecuador. The main results show that the characteristic "values and principles that each of them has (punctuality, responsibility, honesty, etc.)" corresponding to the dimension "values" (student level), has the highest score (4.54 on 5). In addition, it is observed that this result is maintained both in teachers by sex (male and female) and by age group (young adult, middle adult, and older adult) without major difference. It is concluded that the education of values to the students has a significant impact on their academic performance and to improve it, it is proposed that the institution in its academic curriculum should consider aspects such as punctuality, responsibility, and honesty in the training of its professionals.

Moreover, Veas et al (2019) in a multilevel mediation analyses of 1,398 high school students from Alicante, Spain on Academic attitudes (attitudes towards teachers and attitudes towards school) and academic self-concepts. The results highlight the importance of academic self-concept during early adolescence and suggest that academic attitudes are crucial for the future development of educational models. Supported by Adiyo Roebianto's (2020) study done among science students in Indonesia found that both student's attitude and self-efficacy had a significant direct role in determining student achievement in science. To be specific, attitude towards science had the most significant impact on science achievement, over self-efficacy.

Similarly, a study by Abuawad et al (2023) on the impact of college student's eating attitude and lifestyle on the academic performance indicated a positive correlation between the

dietary habits, lifestyle, and academic achievement of college students in the United Arab Emirates. The findings indicate a significant relationship between the self-esteem of college students in the UAE and their eating attitudes or habits, lifestyle, and academic performance.

Dorcas Oluremi Fareo (2019) investigated on the study attitude and academic achievement in biology at a secondary school level in Mubi Metropolis of Adamawa State in Nigeria. Attitude towards Biology is influenced by the perception and beliefs about Biology, learning abilities and competence in Biology and the previous performance and rankings in Biology in schools where the later poses a negative influence.

On the other hand, Jhoselle Tus (2020) studied the influence of study attitudes and study habits on the academic performance among senior high school students in a Catholic School in Bulacan, Philippines. The Descriptive-correlation research revealed that study attitudes and study habits do not significantly affect senior high school students' academic performance.

METHODS

The design of the study was cross-sectional, analytic design. According to Wang, X., & Cheng, Z. (2020) the term cross-sectional refers to a study in which a group of people, or certain information is collected, at a single point in time or over a short period.

Descriptive design was used to describe the body mass index based on the Asian classification, moreover, this is analytic since it determined the relationship of the level 1 medical student's BMI and GPA and attitude and GPA.

Purposive sampling technique was used in the study, where the researcher deliberately selects participants based on a specific characteristics or criteria. The participants of the study were from batch Solas Dei composed of 47 level 1 medical students of the Adventist University of the Philippines – College of Medicine situated in Puting Kahoy, Silang Cavite. Participant's inclusion criteria included students who are enrolled in the program of the second semester, Academic Year 2023-2024. Participants who were willing to participate in the study first received an explanation of their rights and obligations, in which they voluntarily filled out an informed consent form.

While the BMI and Attitude are the independent variables the Grade Point Average (GPA) of the level 1 medical student served as the dependent variable the measurements are as follows: (1) to compute for body mass index the weight in kilograms (kg) and the height in meters (m), up to two decimal places were obtained through the use of a weighing scale and stadiometer, respectively. BMI was calculated using the formula:

$$\text{BMI} = \text{weight in kg} / \text{height in m}^2$$

Subsequently, to categorize the BMI the WHO Asian classification was used.

BMI (kg/m^2)	WHO BMI ASIAN CLASSIFICATION
<18.5	Underweight
18.5 - 22.9	Normal
23 – 24	Overweight
25 – 29.9	Obese I
≥ 30	Obese II

The attitude of the level 1 medical students was measured through the use of a short questionnaire composed of four dimensions namely: (a) respect; (b) empathy and compassion; (c) discipline; and (d) punctuality. The mean average of the level of attitude was used to interpret the scores using the scale below:

Attitude weighted mean range	Verbal interpretation
4.50 - 5.00	Very high
3.50 - 4.49	Above average
2.50 - 3.49	Average
1.50 - 2.49	Below average
1.00 – 1.49	Very low

Lastly, GPA of the level 1 medical students was obtained by records review.

For the analysis of BMI horizontal bar chart was used to display the frequency per category, on the other hand, a vertical bar chart was used to illustrate the level of attitude across the four abovementioned domains.

Consequently, Pearson R Correlation was used to answer the hypothesis of the relation between BMI and GPA; and between Attitude and GPA. The formula for the Pearson R Correlation is shown below:

$$r = \frac{\Sigma(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\Sigma(x_i - \bar{x})(y_i - \bar{y})^2 \Sigma(y_i - \bar{y})^2}}$$

r = correlation coefficient
x_i = values of the x-variables in a sample
$\bar{x}$ = mean of the values of x-variables
y_i = values of the y- variables in a sample
$\bar{y}$ = mean of the values of the y-variables

Furthermore, stack line graphs were employed to visually present the relationships. Microsoft Excel and Prism 9 were used to generate both descriptive and inferential statistics.

RESULTS AND DISCUSSION

This study determined the relationship of BMI and GPA; and Attitudes and GPA focusing on four domains which are respect, empathy and compassion, punctuality, and discipline. The data and the results of the analysis are shown below.

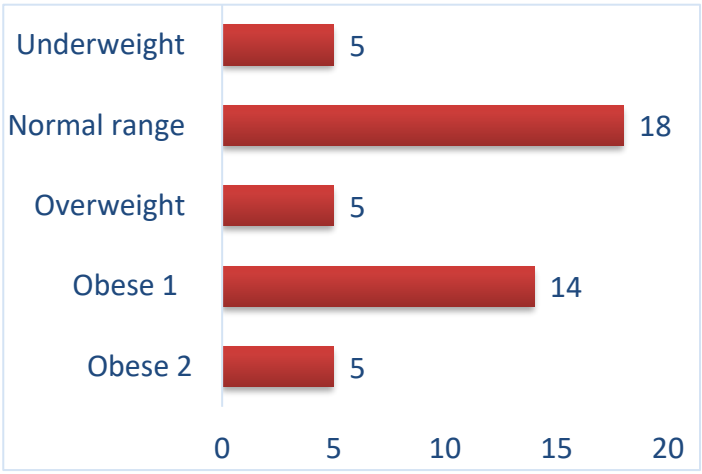

Figure 1.

Body Mass Index of Level 1 Medical students of AUP – COM

The horizontal bar chart (Fig.1) shows that the majority (38%) of the freshmen have BMI within the normal range based on the WHO Asian classification.

On the other hand, 30% or 14 of them were found to be Obese 1, while there are similar frequencies (5 each) who fall under Overweight and Obese 2. It is also quite surprising to see a few freshmen who were found to be underweight.

While attitudes which are shown in Figure 2 were based on the 4-likert scale survey questions. Interestingly, freshmen assessed themselves to have outstanding results. All domains were far way above the upper limit of the Average score (3.50, designated by the red line). The overall weighted mean attitude is 4.63 with a verbal interpretation of Very High.

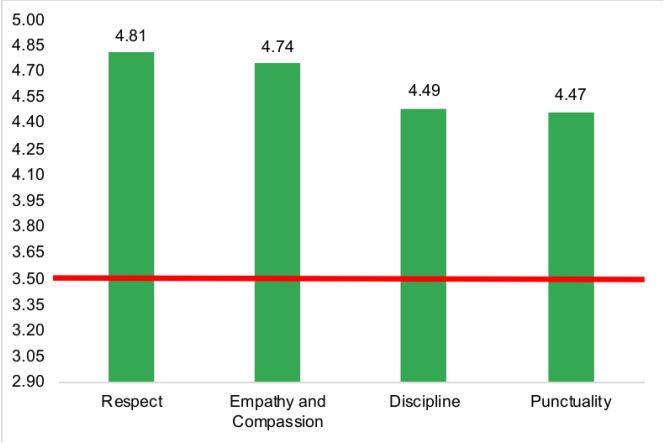

Fig 2.
Attitude of Level 1 Medical Students of AUP

The highest weighted mean attitude domain is Respect, followed by Empathy and Compassion, Discipline, and lastly, Punctuality. Despite the high ratings given by the students to themselves, somehow it reflects the current challenges that they encounter (for example, in punctuality or tardiness and discipline) which still need to be improved. On the other hand, their respect and empathy can be observed by some of the faculty.

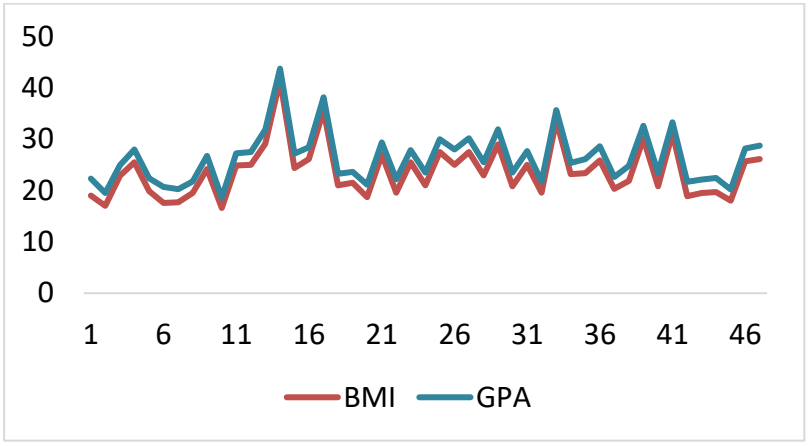

Fig.3

Relationship between Body Mass Index and Grade Point Average

The relationship between the freshmen's BMI and their 2nd semester GPA were analyzed using the Pearson's R correlation test which was shown in Figure 3. Based on the statistical output, the p-value (0.3418) is greater than the alpha of 0.05 which means that the null hypothesis is not rejected. Thus, we do not have sufficient evidence to say that there is a

relationship between BMI and GPA which is supported by the study of Jinbo He et al. (2019), stating that there was a weak negative correlation between BMI and academic achievement.

Despite this non-significant result, the stack line graph above shows the pattern of BMI and GPA obtained by the students. The Pearson correlation test showed that there is a negative relationship (based on a correlation coefficient of -0.14) between BMI and GPA. This means that the higher the BMI of a freshman, the lower is his GPA becomes. Although the statistical test showed a very weak correlation, this is an important finding for Lifestyle Medicine practitioners.

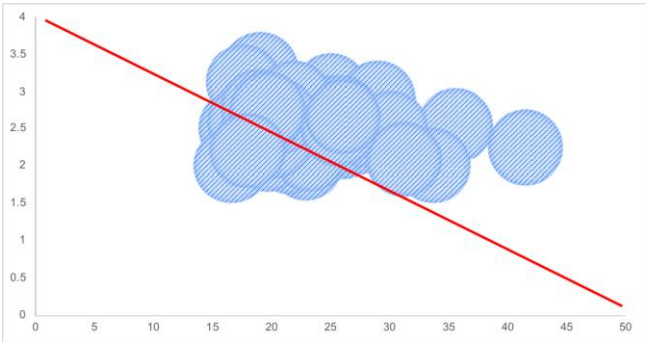

Fig 4.

2D Scatterplot of the Relationship of BMI and GPA

The 2D scatterplot in Figure 4 aims to show how the data points have clustered. Using the red line as the standard of a perfectly negative correlation, we can somehow see the dots follow the direction of the red line, although only to a minimal extent (depicting the very weak correlation).

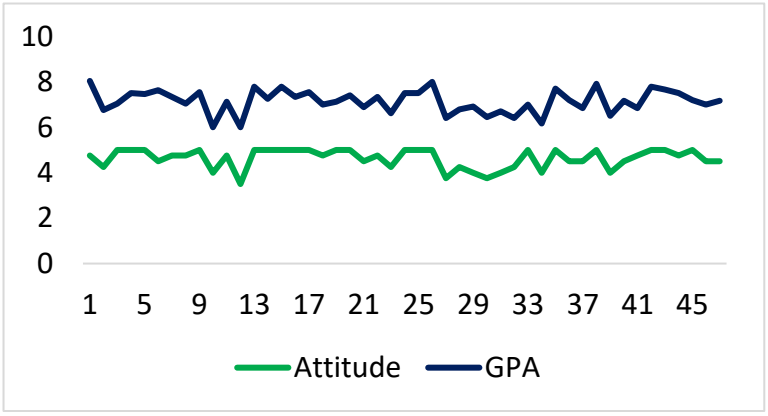

Fig 5.

Relationship of Attitude and Grade Point Average

The last objective is to determine the relationship between Attitude and GPA of the 1st year medical students which is depicted in Figure 5, where the p-value generated (0.9249) is also way above the level of significance of 0.05, which denotes a non-significant result. The correlation coefficient is too low at -0.01 which means a very weak to almost negligible correlation.

Again, the null hypothesis of no correlation between the variables Attitude and GPA cannot be totally rejected.

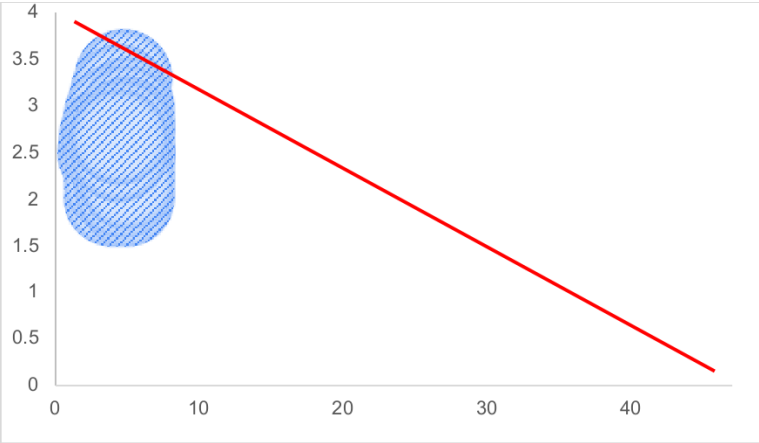

Fig 6. **2D Scatterplot of the Relationship of Attitude and Grade Point Average**

The scatterplot, on the other hand, shows the data point distribution which is too far to depict a negative relationship as shown in Figure 6. This follows the study of Jhoselle Tus (2020) stating that attitudes and study habits do not significantly affect senior high school students' academic performance.

However, going back to the statistical test output, we, as the authors would like to highlight that the Pearson R test was still able to detect a negative relationship between BMI and GPA, even if it is too small and not statistically significant. As clinicians, we would like to embark on its clinical significance rather than its statistical significance.

CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

The BMI of Level 1 medical students is generally not within normal as more than 50% of the batch falls outside of the normal range. On the other hand, the self-assessment of their attitude gave outstanding results. Overall attitude rated as very high. Meanwhile, Respect and Empathy & Compassion rated higher than Discipline and Punctuality domains.

The study found no significant relationship between BMI and GPA, indicating a very weak but negative correlation between BMI and GPA. This means that the GPA tends to decrease for every increase in the BMI. Although this is statistically non-significant. The

attitude and GPA relationship turned very weak negative to almost no correlation. It is also statistically non-significant.

While inferential statistics failed to reveal a distinct relationship between BMI, attitude and GPA, it is important not to dismiss the clinical significance of BMI and the practical significance of attitude in the overall health and wellbeing of Level 1 medical students.

Given the ill effects of abnormal BMI scores on all aspects of health encourage the students to have optimum health by continuing the implementation of lifestyle medicine-related programs so they can achieve holistic individual health.

As early as the first year (Level 1) in the MD program, develop strategies to instill discipline and punctuality in their daily curricular activities. Emphasize that discipline and punctuality will prepare them for the advanced levels of medical school (including clinical rotation) and future actual clinical practice. Maintain respect and empathy towards patients, faculty, and peers. Encourage faculty members to actively engage with the medical students to reinforce positive attitudes (and behaviors) of physicians as they serve as role models.

Continue promoting a healthy medical school environment that supports the adoption and maintenance of health, attitude, and behaviors. Provide opportunities for physical activity and areas for healthier food options.

Propose an annual health examination for medical students. This is to monitor their health status as they progress from one level to another. For instance, coordinate with the AUP Clinic to arrange schedules in between academic year breaks.

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REFERENCES

Abuawad, B., Ellala, Z. K., El-Saleh, M., Alsalhi, N., Al Qatawneh, S., & Aljarrah, K. (2023). Student Eating Attitude and Life Style Impact on the Academic Performance: Evidence from the College Students. *Eurasian Journal of Educational Research*, *103*(103), 18-32.

Agu, A. U., Esom, E. E., Anyaeji, P. S., Nzekwe, K. C., Chime, S. C., Ikele, I. I., ... & Obikili, E. N. (2019). Obesity indices and academic performance of medical students of Igbo extractionat College of Medicine, University of Nigeria. *World J Med Sci*, *16*(4), 191-195.

Alhazmi, A., Aziz, F., & Hawash, M. M. (2021). Association of BMI, physical activity with academic performance among female students of Health Colleges of King Khalid University, Saudi Arabia. *International journal of environmental research and public health*, *18*(20), 0912.

Fareo, D. O. (2019). Study attitude and academic achievement in biology at secondary school level in Mubi metropolis of Adamawa state. *International Journal of Scientific and Research Publications (IJSRP)*, *9*(8), p9253.

He, J., Chen, X., Fan, X., Cai, Z., & Huang, F. (2019). Is there a relationship between body mass index and academic achievement? A meta-analysis. *Public health*, *167*, 111-124.

Hermassi, S., Hayes, L. D., Bragazzi, N. L., & Schwesig, R. (2021). Physical fitness and academic performance in normal weight, overweight, and obese schoolchild handball players in Qatar: A pilot study. *Frontiers in Psychology*, *11*, 616671.

Ishihara, T., Nakajima, T., Yamatsu, K., Okita, K., Sagawa, M., & Morita, N. (2020). Longitudinal relationship of favorable weight change to academic performance in children. *npj Science of Learning*, *5*(1), 4.

Livermore, M., Duncan, M. J., Leatherdale, S. T., & Patte, K. A. (2020). Are weight status and weight perception associated with academic performance among youth?. *Journal of eating disorders*, *8*, 1-10.

Mendoza-Castejón, D., & Clemente-Suárez, V. J. (2020). Autonomic profile, physical activity, body mass index, and academic performance of school students. *Sustainability*, *12*(17), 6718.

Moon, R. C. (2020). The associations between childhood obesity, academic performance, and perception of teachers: From kindergarten to fifth grade. *Childhood Obesity*, *16*(6), 403-411.

Ortiz-Moya, R., Valverde-Alulema, F., Mejia-Madrid, G., & Sanchez-Alejandro, M. (2020). Characteristics That includes the Academic Performance Of Students Of The Central University Of Ecuador From The Teaching Perspective. In *INTED2020 Proceedings* (pp. 3127-3134). IATED.

Roebianto, A. (2020). The effects of student's attitudes and self-efficacy on science achievement. *Jurnal Pengukuran Psikologi Dan Pendidikan Indonesia (JP3I)*, *9*(1), 1-10.

Tus, J. (2020). The influence of study attitudes and study habits on the academic performance of the students. *International Journal of all research writings*, *2*(4), 11-32.

Veas, A., Castejón, J. L., Minano, P., & Gilar-Corbí, R. (2019). Early adolescents' attitudes and academic achievement: The mediating role of academic self-concept. *Revista de Psicodidáctica (English ed.)*, *24*(1), 71-77.

Wang, X., & Cheng, Z. (2020). Cross-sectional studies: strengths, weaknesses, and recommendations. *Chest*, *158*(1), S65-S71.