Low Back Pain Among Students in a Private University During Online Classes: Prevalence, Level of Disability and Associated Contextual Factors

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Abstract *– The increased adoption of online mode of classes among higher educational institutions after the onset of COVID-19 pandemic led to increased reports of poor posture and long periods of sitting that contribute to the onset of LBP among students. Despite this concern, there are still no studies that attempted to explore LBP among college students during online classes. This online cross-sectional quantitative exploratory study aimed to determine the prevalence and level of disability of LBP among college students in Lyceum of the Philippines University-Batangas (LPU-B) through the use of Modified Oswestry Disability Index (mODI) and the associated personal and environmental factors. Respondents were determined through stratified random sampling. Descriptive statistics was used to identify the prevalence and level of disability, while non-parametric tests such as Mann Whitney U, Kruskall Wallis, and Spearman rank correlation test were used to determine if there is a significant association between the contextual factors and the mODI score. Results showed that the overall prevalence of LBP among LPU-B college students is high (78.95%), with females, first year students, CCJ, COD and COE students, underweight students and those who sit for three to four hours have the highest prevalence rates among categories. 57 out of 60 students had minimal disability. The contextual factors included in this study were found to not have a significant difference on the disability level of the respondents with LBP. Further studies with the inclusion of environmental factors in the questionnaire are warranted.*

Keywords *– college students, disability, ICF, LBP, low back pain*

INTRODUCTION

Low back pain (LBP) is pain, muscle tension, or stiffness that can be felt below the costal margin (lower chest) and above the inferior gluteal folds (buttock) [1]. LBP can affect people of all ages, and included in the population who are at risk for developing LBP are college students [2].

In 2019, 7.75% of the total years lived with disability (YLDs) among Filipinos from 10-24 years old was due to LBP, with an annual change of -0.18% [3]. Despite the annual change being negative, LBP among students belonging in the mentioned age range can still be a growing concern as there are changes that happened over the pandemic.

Among the changes that occurred after the onset of the Coronavirus Disease (COVID-19) pandemic is the increased adoption of online mode of classes among higher educational institutions [4]. This shift could lead to increased risk of developing LBP, as individuals who undergo online learning can develop LBP due to factors such as improper posture, poor ergonomics and prolonged sitting [5].

The factors associated with LBP can be explored through the International Classification of Functioning, Disability and Health (ICF) Framework, since its use in the clinical practice can facilitate identification and assessment of back pain problems as they occur in daily life, and therefore be helpful in LBP management [6]. ICF is considered as a common language and data standard, capable of being used for different purposes and across a variety of settings. This framework has been implemented in various levels, and employed in studies which involve health and disability data collection in surveys of general and specific populations, data compilation and analysis, and development of disability survey modules and question sets [7].

However, despite the benefit of ICF, there are still no studies that employ the framework in exploring factors leading to LBP in students, specifically in the context of pure online classes.

OBJECTIVES OF THE STUDY

This study attempted to explore the prevalence of LBP during online classes among a specific student population, the Lyceum of the Philippines University-

Batangas (LPU-B) college students, which will not only benefit the respondents but the society as a whole, since there will be a body of knowledge that can be utilized and used for future studies which can involve a wider scale of population. This study has three aims, namely: to determine the prevalence of LBP among LPU-B college students during online classes, to determine the level of disability among respondents with complaints of LBP during online classes through administration of online survey that incorporates the Modified Oswestry Disability Index (mODI), and to use the ICF Framework in determining the positive and negative contextual factors that can be associated with LBP, as shown in Figure 1.

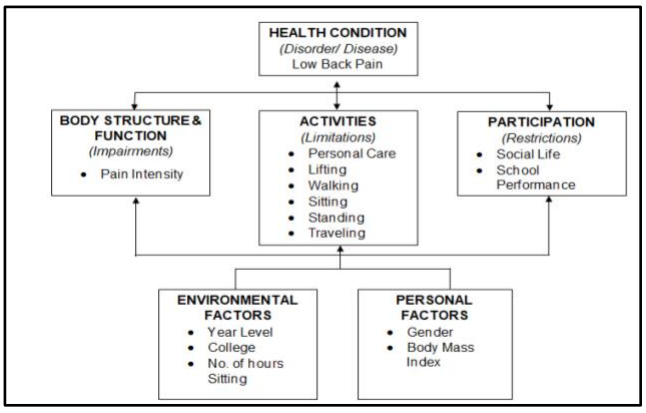

Fig. 1. International Classification of Functioning, Disability and Health (ICF)

MATERIALS AND METHODS

RESEARCH DESIGN

The study used an online cross-sectional quantitative exploratory design to determine the prevalence and level of disability of LBP among college students in Lyceum of the Philippines University-Batangas (LPU-B) using Modified Oswestry Disability Index (mODI) and the associated personal and environmental factors.

RESPONDENTS

The required sample size for the study was determined using G-Power from the population data provided by the University Registrar and Colleges. The researchers set the input parameters as two-tailed with an alpha value of ($\alpha = 0.05$) and a power value of ($p = 0.80$) which yielded a total sample size of 84. The undergraduate college students of LPU-B as the respondents were divided per college and department they were enrolled in using stratified random sampling. The 84 respondents comprised of 15 students from College of Allied Medical Professions (CAMP), 22 students from Lyceum International Maritime Academy (LIMA), 4 students from College of Dentistry (COD), 16 students from College of International Tourism and Hospital Management (CITHM), 8 students from College of Nursing (CON), 9 students from College of Business Administration (CBA), 2 students from College of Engineering (COE), 2 students from College of Criminal Justice (CCJ), 2 students from College of Computer Studies (CCS), and 4 students from College of Education, Arts and Sciences (CEAS). This was done so that all colleges would be represented within the yielded sample size.

Respondents were allowed to proceed through the survey proper if they are college students enrolled in an undergraduate program in LPU-B, college students currently attending online classes, college students with a device (e.g. cellphone, laptop, tablet, etc.) connected to the internet through WiFi or mobile data and college students with experience in answering surveys written in English. Additional inclusion criteria in proceeding to the second portion of the survey are respondents who experienced LBP during online classes.

Respondents are not allowed to proceed to the survey if they are college students enrolled in the Physical Therapy (PT) program, college students that are in their internship year, college students diagnosed with comorbidities such as cancer, neuropathy and radiculopathy, college students without a device that can be connected to the internet through WiFi or mobile data, and college students who have previously used the mODI questionnaire. Additional exclusion criteria for the second portion of the survey are for college students who answered that they do not experience LBP during online classes and those who answered that they experienced LBP prior to the start of online classes.

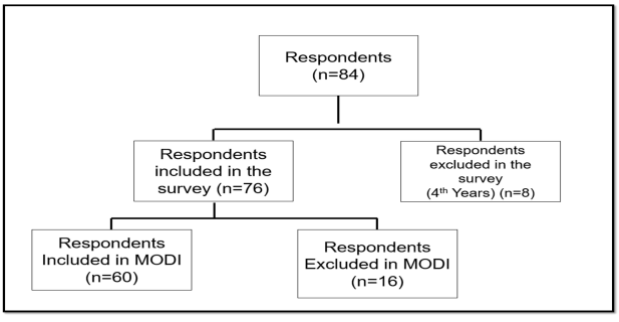

Fig. 2. Respondent Selection

DATA GATHERING INSTRUMENT

A survey questionnaire was made in Google Forms, which consisted of 17 questions divided into three sections as to: (1) demographic characteristics such as

sex, year level and college; (2) LBP such as experience and onset, and (3) mODI as to classify the disability of the respondents.

The Modified Oswestry Low Back Disability Questionnaire (mODQ) or Modified Oswestry Disability Index (mODI) covers pain intensity, self-care, sleeping, social life, and employment/homemaking. This questionnaire is used to identify the prevalence of LBP and its associated factors [8].

The mODI has good construct validity with a Pearson correlation coefficient with a score of 0.751 that demonstrates strong qualities (content and construct validity, feasibility, linguistic adaptation and international use). The mODI has a Cronbach Alpha value of 0.7917 reflects high internal consistency as it measures a relatively narrow aspect of health, namely low back pain. Reliable internal structure allows confidence in the measurement of the status of a patient's disability resulting from low back pain of the participants [9]. The mODI also has a good responsiveness indicated by a Guyatt's Responsiveness Index (GRI) score of 3.49 A large GRI indicates greater responsiveness [10].

DATA COLLECTION PROCEDURES

A test-run of the survey questionnaire with 30 respondents was conducted online and was sent through Google Mail and/or Messenger. Data from the test-run was not included in the study.

The survey questionnaire was distributed online through Google Forms® among 84 respondents with the assistance of the college deans and secretaries for randomization of respondents. Only the respondents were able to access the survey attached within the email with their assigned code. No incentives or rewards were given to the respondents. The survey was conducted for 5 months, which started from January 25, 2022 and ended on May 7, 2022. The gathered data were manually recorded in a Microsoft Excel® spreadsheet and subjected to analysis by the statistician using the Jeffrey's Amazing Statistics Program (JASP) ® version 0.16.

DATA ANALYSIS

The prevalence of LBP among LPU-B undergraduate students is determined by dividing the number of students in the sample with LBP with the total number of undergraduate college students of LPU-B in the sample. The researchers used descriptive statistics in this study, specifically measures of central tendency (mean, median) and variability (range, percentile, variance, standard deviation) to describe the prevalence of LBP among university students of LPU-B per sex, year level, college, BMI and number of hours sitting and to identify the score and level of disability using mODI. Non-parametric tests such as Mann Whitney U Test and Kruskal Wallis tests were used to identify the difference of identified contextual factors (independent variables) and level of disability based on mODI score (dependent variable). Spearman rank correlation was used in measuring the association of independent variables and the dependent variable.

ETHICAL CONSIDERATION

The study was approved by the Ethical Review Board of Lyceum of the Philippines University-Batangas (A1-2021-081) and was in accordance with the Declaration of Helsinki. Consent form was provided for each respondent which included the purpose of study and the right of respondent to withdraw at any time without completing the questionnaire. Respondents' anonymity was assured by assigning each respondent with a code to adhere to Data Privacy and to prevent duplication of responses.

RESULTS AND DISCUSSION

Prevalence of LBP

The first objective of this study is to determine the overall prevalence of LBP among undergraduate college students of LPU-B during online classes. Table 1 shows the responses with regards to experiencing LBP and its prevalence rate among LPU-B undergraduate students.

Table 1. Overall Prevalence Rate of LBP among LPU-B College Students during Online Classes

Variables	F	%
Experiences LBP	60	78.95
LBP before online classes	8	10.53
No LBP	8	10.53
Prevalence Rate*		**78.95%**

** Prevalence Rate = # of sample with LBP / # of sample x 100*

Results show that among 76 respondents, 60 (78.95%) are currently experiencing LBP. Among the remaining 16 respondents, results show that 8 (10.53%) of them were already experiencing LBP before online classes and 8 (10.53%) respondents do not experience LBP at all. High prevalence rate indicates that LBP is a common condition among the population. This could be due to exposure to online learning, which puts students at risk for developing LBP due to different factors such as improper posture, poor ergonomics and prolonged sitting [5]. Previous studies support the results of this study, and revealed that LBP is prevalent in undergraduate students, with prevalence rates of 74.6% among Malaysian students [11] and 71.6% among Pakistan students [12].

However, there is no sufficient data to directly compare the prevalence rate of LBP among the same population and in the same context, as this is the first study to explore this phenomenon among students of LPU-B in the online class setting.

Table 2. Prevalence Rate of LBP among LPU-B College Students per Category

Variables	Total (n=76)	Excluded* (n=16)	With LBP (n=60)	Percentage with LBP (%)	Prevalence Rate per Category (%)
Sex					
Female	39	6	33	55.00	84.62
Male	37	10	27	45.00	72.97
Year Level					
1st Year	9	1	8	13.33	88.89
2nd Year	31	6	25	41.67	80.65
3rd Year	36	9	27	45.00	75
College					
CAMP	13	2	11	18.33	84.61
CBA	7	3	4	6.67	57.14
CCJ	2	0	2	3.33	100
CITHM	16	4	12	20.00	75
COD	4	0	4	6.67	100
COE	2	0	2	3.33	100
CCS	2	2	0	0	0
CON	8	1	7	11.67	87.5
LIMA	22	4	18	30.00	81.81
BMI					
Underweight	19	2	17	28.33	89.47
Normal	28	5	23	38.33	82.14
Overweight	21	7	14	23.33	66.67
Obese	8	2	6	10	75
No. of Hours Sitting					
1 hour to 2 hours	6	1	5	8.33	83.33
2 hours to 3 hours	8	1	7	11.67	87.5
3 hours to 4 hours	11	1	10	16.67	90.90
4 hours to 5 hours	15	5	10	16.67	66.66
More than 5 hours	36	8	28	46.67	77.78

** Excluded in the second part of questionnaire = respondents who experienced LBP before online classes and respondents who do not experience LBP at all*

Table 2 displays the demographic profile of the LPU-B college students in terms of their sex, year level, college they are enrolled in, BMI, and the number of hours they spend sitting before experiencing LBP. The table also shows the total number of responses for each category, the number of respondents excluded (with LBP before online class and no LBP), number and percentage of the sample that experiences LBP, and the prevalence rate per category.

With regards to sex, the result shows that among the respondents who experience LBP during online class, 55% are female, with a prevalence rate of 84.62%. Males comprised 45% of the sample with LBP, and showed a prevalence rate of 72.97%.

Studies reveal that there is a higher prevalence of LBP among females than male college students [13], [12], [2], which supports the results of this study. However, the study by [11] contradicts the result of this study, as it was revealed that there is a higher incidence of LBP among males (77.8%) than females (74%), showing a slight difference between the prevalence rate per sex.

As per the prevalence rate per year level, 1st years had the greatest percentage (88.89%), followed by 2nd year (80.65%) and 3rd year (75%).

These results are consistent with the study of [14], which revealed that third year students showed a higher percentage of respondents with LBP with more than 50% of the population. As per prevalence rate, the results are supported by the study of [11], which shows that first year students, despite having the lowest number of respondents (11) gained the highest prevalence rate (81.1%) compared to second year (72.2%) and third year (73.5%). Furthermore, the study

by [15] revealed that second year students have the highest prevalence rate (21.89%), followed by third year (21.63%) and first year (21.26%), which shows only slight differences between rates.

Differences in the prevalence rate of undergraduate college students might possibly be due to the different academic demands of the student per year level. However, it is not included in the scope of this study to further explore the academic demands per year level and per program.

As per the prevalence rate per college the respondents are enrolled in, the College of Criminal Justice (CCJ), College of Dentistry (COD), and College of Engineering (COE) all garnered a 100% prevalence rate, which means that all respondents experience LBP during online classes.

The high prevalence rate among dentistry students recorded in this study is supported by the previous studies of [15] and [16], which briefly mentioned that LBP is prevalent among dentistry students. As per engineering students, a study by [17] about the prevalence of LBP among engineering students of a university in Pakistan supports the results of this study, as there is also a 100% prevalence rate of LBP among engineering students of their campus. As of the moment, there are no studies with regards to the prevalence of LBP among students studying courses related to criminal justice.

Results from articles that aimed to determine the prevalence of LBP in specific programs were used as supporting studies, as same programs are more likely to have the same academic demands. However, since it is not included in the scope of our study, the specific academic demands per university and per program were not further explored.

As per the prevalence rate per BMI category, underweight respondents gained the greatest prevalence rate (89.47%), followed by respondents with normal BMI (82.14%), and obese respondents (75%). Overweight respondents garnered the lowest prevalence rate (66.67%). There are no other studies that explore the prevalence rate of undergraduate students with regards to their BMI. The results of this study suggest that the BMI of LPU-B undergraduate students are not directly proportional to the prevalence of LBP, as it was found that LBP is more prevalent than those with lesser BMI (underweight and normal) than those with higher BMI (overweight and obese). This shows that bones, ligaments, discs and other structures of the lumbar spine can also be affected not just by being overweight, but also due to lack of lean body mass, which happens among underweight people [18].

As per the prevalence per number of hours sitting, respondents who sit from 3 to 4 hours each day showed the highest rate (90.90%) or 10 out of 11 respondents, while those who sit for 4 hours to 5 hours garnered the lowest prevalence rate (66.66%). This suggests that the number of hours spent in sitting is not directly proportional to the prevalence of LBP, as lower ranges (1 hour to 4 hours) had higher prevalence rates than higher ranges (4 hours to more than 5 hours). This can mean that aside from the time spent in sitting, other factors might also cause LBP, such as postures and ergonomics, which are not included in the scope of this study. Therefore, studies that explore such factors are recommended to further determine the relationship of sitting and the prevalence of LBP.

Level of LBP Disability

Table 3. mODI Scores of LPU-B College Students with LBP

Statistics	mODI Score	mODI %
Mean	4.367	8.733
Std. Deviation	3.626	7.253
Minimum	0	0
Maximum	15	30

Results show that the mODI score ranges from 0 to 15, with a lower score manifesting a lower level of LBP disability. The mean score is 4.367 (SD=3.627), a little lower compared to what a student might get at the maximum level to any of the conditions presented on the mODI.

Meanwhile, the equivalent percentage of the mODI score is computed using the formula *raw score/50 x 100* [10], and used to determine the level of disability caused by LBP. The mODI equivalent percentage ranges from 0% to 30% (SD=7.253%). This indicates that the level of LBP disability among the LPU-B college students can be described as a minimal disability to moderate disability, which is shown in Table 4.

Table 4. Level of Disability of the LPU-B College Students with LBP based on mODI scores

mODI Interpretation	Frequency	Percent
Minimal Disability	57	95.00
Moderate Disability	3	5.00

The interpretation of mODI scores by [19] was used in this study, where 0% to 20% indicates minimal disability and 21%-40% for moderate disability.

The results of this study show that 57 respondents (95%) have minimal disability. This means that these students can handle the disability and they can cope with most of their living activities without requiring intervention [19].

Meanwhile, 3 respondents (5%) experience moderate disability. This indicates that the students experience more pain and difficulty with sitting, lifting, and standing. Thus, necessary precautions are needed since they might get banned from doing heavy work as travel and social life might be difficult to maintain. On the side note, personal care, sexual activity, and sleeping may not be grossly affected. Therefore, these students are advised to manage their activities with conservative means [19].

The study by [15], which used the similar outcome measure (mODI) as this study, revealed that the majority of college students (87.3%) have minimal disability, and the remaining number of respondents (12.7%) have moderate disability, which supports the results of this study.

Associated Contextual Factors

Lastly, the third objective of this study is to use ICF in determining the positive and negative contextual factors that can be associated with LBP. Several contextual factors such as gender, year level, college the students are enrolled in, number of hours sitting prior to onset of LBP, and BMI were studied as per their association to the level of disability of the respondents.

Table 5. Association of Sex and the mODI Score

Variables		Median
Sex		
Female		4.0
Male		3.0
U	**p**	**Remarks**
475	0.664	Not Significant

Table 5 shows that the mODI scores of female college students (Mdn=4.0) were higher compared to male (Mdn=3.0), indicating a higher perceived level of disability of LBP. However, a Mann-Whitney test indicated that this difference is not statistically significant, U=475, p=0.664.

The results of this study show that gender, which is considered a personal factor in the ICF, does not have a significant association with the level of LBP disability despite its high prevalence rate among females. Studies reveal that gender was found to have no significant association with LBP despite having a higher incidence rate in the female population [20], [2]; [21], which support the results of this study. This can be further supported by the study of [22], which states that despite having no difference between most of the static and dynamic postural control variables associated between genders, an increased perception of pain and fear of movement are more associated with impaired dynamic postural control in females associated with chronic LBP.

Table 6.Association of Year Level, College and No. of Hours Sitting and mODI Score

Variable	H	df	p	Remarks
Year Level	0.947	2	0.623	Not Significant
College	12.221	7	0.094	Not Significant
No. of Hours Sitting	6.975	4	0.137	Not Significant

A Kruskal-Wallis Test was used to determine the level of disability of LBP when grouped based on the student's profile, specifically year level, college they are enrolled in, and number of hours sitting prior to the onset of LBP.

Table 6 shows that the level of disability of LBP among the LPU-B college students were not statistically different when they were grouped based on year level (H=0.947, p=0.623), college where they belong (H=12.221, p=0.094), and number of hours sitting (H6.975, p=0.137).

In terms of year level, which is considered an environmental factor in the ICF, this study provides evidence that this variable is not a significant contextual factor in the association of LBP disability among LPU-B College students during online classes. In the present study, the highest prevalence rate was seen among first year students, followed by the second year students, and with the third year students having the lowest prevalence rate. This is consistent with the study of [11], which stated that first years have a higher incidence rate despite having the least number of respondents. However, the results of this study contradicts the results of [20], which revealed that years of study has a significant association with LBP due to

the undergraduates having more years in the study being generally older in age. Contrasting findings between the present and the previous studies may be due to different workloads seen between online classes and the face to face classes these previous studies were conducted in despite the increase of workloads with each year.

In terms of the college the respondents are enrolled in, which is considered an environmental factor in the ICF, this study provides evidence that this variable is also not a significant contextual factor in the association of the LBP disability of LPU-B college students during online classes. The present study is similar to the study of [2], which stated that there were no differences between physical education students (60.7%) and medical students (53.4%) in terms of prevalence of LBP. This is in contrast with the study of [13] whose results showed that lower frequency of backaches were noted among physiotherapy students but architecture students were noted as having the worst sample results, thus leading them to state that difference between departments may reflect variation in stress levels that could possibly have a significant association with backaches. Further contrast is seen in the study of [11] wherein a higher incidence of 90.57% was seen among a health science program of a university. Discrepancies in results are possibly due to differences in workloads per college, inter-student cross-cultural factors and behavior [20], [13].

In terms of number of hours sitting, which is considered an environmental factor in the ICF, this study provides evidence that this variable is not a significant contextual factor in the association of LBP disability from LPU-B college students during online classes. The reason for this could be due to the difference in chairs used in the home setting for online classes compared to the used chairs in the university seen in the face to face setting. The results of the present study are also consistent with the study of [13] in which they report sedentary behaviors have no significant results compared to other measures of experiencing stress and depression which can be added in future studies in the context of online classes. This is further supported by the study of [2], in which the results did not show influence of the number of sitting and exercising hours in the occurrence of LBP. Lack of significance of the results in this present study may be attributed to the young population and different behaviors of students during online classes. Despite these however, a contrast is seen in with the results of [11] wherein they showed a 79% of incidence of students having prolonged sitting for more than 3 hours a day in the 74.6% incidence rate of the population. Further contrast in the present study could be seen in the results of [16] for dentistry students, wherein they state that adaptation of these positions for a long period can result in negative changes and an overall imbalance of the axis of the spine which can be associated with LBP. The result of the study by [23] also stated that the duration of sitting straight was another factor that could explain nonspecific low back pain among university students.

Table 7. Association of BMI and the mODI Score

Variables	ρ	p	Remarks
MODI Score and BMI	-0.011	0.935	Not Significant

A Spearman Rank Correlation test was conducted to determine if a significant relationship exists between the level of disability of LBP and the respondents' BMI. Table 7 shows that there exists a negative correlation between the variables (=-0.011), however not significant, p=0.935. This study provides evidence that BMI, a personal factor in the ICF, is not a significant contextual factor in the association of LBP disability from LPU-B college students during online classes. These results are consistent with a previous study [21], stating that there are no differences in LBP in relation with BM. No significant associations between BMI and LBP were also seen in the results of [20] stating that this can be attributed to rapid changes of weight in a short period of time may not have an effect on the low back of younger adults. Stress and depression were found to be stronger measures to be associated with backache instead of physical measures such as BMI which was evidenced to have no significant association with LBP in the study of [13]. Such measures may be included in future studies in the context of online classes.

LIMITATIONS OF THE STUDY

It must be taken into account that most of the articles used in this research as supporting studies are conducted prior to the start of the COVID-19 pandemic, where pure online classes were not yet implemented. This is due to the lack of studies that explore the prevalence of LBP in the context of online classes. There is also lack of studies with regards to the prevalence of LBP among undergraduate students of different programs and colleges, as most of the available literature focus on medical and health-allied programs. The survey was also conducted online and with a limited number of respondents, as this was the

most feasible way during the implementation period, where face to face interactions were limited.

CONCLUSION AND RECOMMENDATION

The overall prevalence of low back pain among undergraduate college students of LPU-B is high (78.95%). Prevalence rates per category (sex, year level, college, BMI and number of hours sitting) are also reported to be high, with females, first year students, students from CCJ, COD and COE; underweight students, and those who sit for three to four hours having the highest prevalence rates among the categories. The overall level of disability of the university was minimal as per the results of the mODI questionnaire.

Results also show that the contextual factors (sex, year level, college, BMI and number of hours sitting) included in this study do not have a significant effect on the disability level of the respondents with LBP. The cause of LBP and the respective disability score of the respondents may potentially be seen in other environmental factors where the undergraduate students of LPU-B are situated during online classes, which require further research.

From the conclusion and results presented, the researchers suggest the following recommendations: (1) Additional environmental factors besides year level, college and number of hours sitting must be included to the questionnaire as part of the contextual factors seen in the ICF. (2) Upcoming research/es and similar studies must be done to substantiate the latest information about determination of the prevalence rate of LBP among college students, along with the level of disability. (3) Studies which focus more on dentistry and engineering students are also suggested, considering that these programs showed the highest prevalence rate among all respondents. (4). A larger sample concerning not only one university and including all college programs is suggested to provide a wider scope of study.

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