



The Lasallian Journal of Medicine and Health Sciences

Volume 5

Issue 1

2020

2020

VOLUME NO. 5

ISSUE NO.1

THE LASALLIAN JOURNAL OF MEDICINE AND HEALTH SCIENCES



THE OFFICIAL SCIENTIFIC PUBLICATION OF THE DE LA SALLE MEDICAL AND HEALTH SCIENCES
INSTITUTE

Gov. D. Mangubat Ave.
Dasmarinas City, Cavite, Philippines, 4114

THE LASALLIAN JOURNAL OF MEDICINE AND HEALTH SCIENCES

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Prevalence of Family Influences and Protective Factors in Violence and Unintentional Injuries Among Youth - at - Risk : Imperatives for Youth Violence Prevention

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Abstract

Objective : To determine association between violence and unintentional injuries and family influences and protective factors among youth-at-risk (13-15 yrs old) in public and private high schools in Cavite

Methods: This cross-sectional study constituted of 1526 enrolled at public and private high schools in Cavite for the school year 2015-2016. Self-administered questionnaires Global School-based Student Health Survey Questionnaire, SCREEM Family Resources Survey, and Filipino Family APGAR were distributed to the participants.

Results: The prevalence of violence and unintentional injuries, physical attacks, serious injuries, and bullying are 29.3%, 36.84 %, and 27.56 % respectively. As for the prevalence of protective factors, 11.55 - 40.47% of youth received some forms of parental regulation and monitoring, while 20.75 % missed classes without permission and 44.27 % perceived social

support at school. As regards family influences, 54.69 % of youth have highly functional families and 60.51 % have adequate family resources.

Conclusion / Recommendation: Youth were at risk of violence and unintentional injury, had highly functional families and adequate family resources, and low parental regulation and monitoring. Family functioning, family resources, and school attendance were associated with physical attacks and serious injuries; while perceived social support at school and family functioning were associated with bullying. Results of this study may be used in designing a Youth Violence Prevention Program at school.

Keywords: Youth, violence, unintentional injuries, bullying, family, protective factors

INTRODUCTION

Violence and unintentional injuries among youth-at-risk are recognized as global public health challenges. "Violence is the intentional use of physical force or power, threatened or actual, against oneself, or against a group or community that either result in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation." [1] "According to the Article 19 of the Convention on the Rights of the Child, violence against children refers to all forms of physical or mental violence, injury and abuse, neglect or negligent treatment, maltreatment or exploitation, including sexual abuse". [2] "Violence can result in death, injuries and disabilities. Over the course of their lifetime, children exposed to violence are at increased risk of mental illness and anxiety disorders; high-risk behaviors like alcohol and drug abuse, smoking and unsafe sex; chronic diseases such as cancers, diabetes and heart disease; infectious diseases like HIV; and social problems including educational under attainment, further involvement in violence, and crime." [3]

As underscored by the United Nations Educational, Scientific and Cultural Organization (UNESCO). "almost one in

three students (32%) has been bullied by their peers at school at least once in the last month. In all regions except Europe and North America, physical bullying is the most common, and sexual bullying is the second most common type of bullying. In Europe and North America, psychological bullying is the most common type of bullying. Cyberbullying affects as many as one in ten children. More than one in three students (36%) has been involved in a physical fight with another student and almost one in three (32.4%) has been physically attacked at least once in the past year." [4]

"The National Baseline Study on Violence Against Children in the Philippines reported that eighty percent of children aged 13 to 24 years had experienced some forms of violence in their lifetime, whether in the home, school, workplace, community, or during dating. The estimated total prevalence of violence against children among males was 81.5 percent and 78.4 percent among females. Three out of five children were physically and psychologically abused and bullied, and almost one in five children was sexually violated." [5]

Emerging evidence in the Philippines suggests that "violent discipline is considered as the most conventional form of violence against children which is embedded in social norms and driven by factors

including its supposed effectiveness, traditional respect for parental authority, financial stress, and the level of parental education. Physical violence is also the prevalent form of violence perpetrated by adults in schools. A principal driver of this is, as at home, social norms relating to the acceptability of corporal punishment. Children are more likely to experience violence at the hands of other children than adults. A driver of bullying in school is children's previous experience of violence at home." [6]

"The Republic Act (RA) No. 10627, otherwise known as Anti-Bullying Act of 2013 obliges all elementary and secondary schools to adopt policies to prevent and address the act of bullying in their institutions. Based on Department of Education (DepEd) Order No. 55 s. 2013, all public and private schools shall adopt bullying prevention programs which shall be applicable to all students regardless of the level of risk or vulnerability to bullying." [7]

Youth violence is related to numerous risk and protective issues. It has been established that there are family characteristics being linked to youth violence such as low parental involvement, minimal emotional closeness and affection with, low educational attainment of parents and minimal family income, weak family functioning and inadequate time for monitoring and supervision of children. However, the presence of protective factors may safeguard the youth from violence persecution or commission and these include "youth's positive orientation, highly developed social skills and competencies, above average intelligence, positive attitude toward family and school, high educational aspirations, possession of affective relationships with those at school that are strong, close and prosocially oriented, connectedness to family or adults outside the family, close relationship to at least one

parent, ability to discuss problems with parents, intensive parental supervision, above-average socio-economic status of the family and positive parental attitudes toward the child's education." [8,9]

This prompted the researchers to examine the relationships among violence and unintentional injuries, family influences, and protective factors to be able to design a school-based Youth Violence Prevention Program with the aim of decreasing violence and unintentional injuries and enriching the family influences and protective factors among youth - at -risk.

METHODOLOGY

This is a cross-sectional study that involved 13-15 years old high school students from all municipalities in Cavite. A two-stage stratified, cluster sampling method was utilized to select participating public and private high schools. The study included 218 high school students from each district of Cavite (total population= 218 students x 7 districts= 1,526 students) to be able to estimate the prevalence of violence and unintentional injury with 95% confidence level at 17.1% with 5% precision for each district. In each district, two schools, one private and one publi, were selected by simple random sampling. And in each school, clusters of one or two sections (depending on a number of students) per year level were randomly selected. A minimum of 109 high school students (or 28 students per year level) were included from each school. The 2011 Filipino version of the Global School-based Student Health Survey Questionnaire (GSHS) was used to measure violence and unintentional injury among youth. In terms of family influences, the SCREEM Family Resources Survey (SCREEM-RES) provided a measure of general family resources. The Family APGAR (Adaptation, Partnership, Growth, Affection, and Resolve

) tool was also utilized to qualitatively measure the family functioning of youth. Data were encoded in Epi-Info 2000 and analyzed using SAS v. 9.2. Frequency distribution tables were generated to summarize the variables of the study. Crude Odds ratios and corresponding 95% confidence intervals were computed to describe the association of family influences and protective factors with violence and unintentional injuries among youth. Chi-square test was used to determine if the association is statistically significant. Multiple logistic regression was done to

predict violence and unintentional injuries in youth.

RESULTS AND DISCUSSION

Violence and Unintentional Injury

The prevalence of physical attacks among youth at risk during the 12 months before the survey is 29.31 % . About one in three youth (29.48%) had been in a physical fight one or more times during the 12 months before the survey. The prevalence of serious injuries among youth is 36.84%. Among those who reported being seriously injured

Violence and Unintentional Injury	Total % (95% CI)	Gender		Age		
		Male (%)	Female (%)	11 to 12 (%)	13 to 15 (%)	16 to 18 (%)
Physical Attacks						
Percentage of youth who were physically attacked one or more times during the 12 months before the survey	29.31 (27.13, 31.56)	34.75	25.14	30.65	29.4	26.74
Percentage of youth who were in a physical fight one or more times during the 12 months before the survey	29.48 (27.27, 31.70)	33.71	26.25	35.48	29.12	31.4
Serious Injuries						
Percentage of youth who were seriously injured one or more times during the 12 months before the survey	36.84 (34.52, 39.21)	43.12	32.03	33.87	36.54	44.19
Percentage of youth who were seriously injured one or more times during the 12 months before the survey and had a broken bone or a dislocated joint as their most serious injury	18.93 (15.21, 22.64)	25.12	12.68	7.14	18.81	26.92
Percentage of youth who were seriously injured one or more times during the 12 months before the survey and whose most serious injury was the result of a fall	15.46 (11.98, 18.94)	11.11	19.81	35.71	14.97	11.54
Percentage of youth who were seriously injured one or more times during the 12 months before the survey and whose most serious injury was the result of motor vehicle accident	6.28 (3.94, 8.62)	7.73	4.83	0	6.15	11.54

Table 1. Prevalence of Violence and Unintentional Injury among Youth-at-Risk by Gender and Age Group, Cavite, 2015

one or more times during the 12 months before the survey, approximately one in five youth (18.93%) sustained a broken bone or a dislocated joint. The youth admitted that their most severe affliction was the result of a fall (15.46 %) and motor vehicle accident (6.28 %) . The prevalence of bullying among youth is 27.56 % . Among those who were bullied on one or more days during the 30 days before the survey, bullying incidents involved being hit, kicked, pushed, shoved around or locked indoors (6.63 %), by making fun of because of their race, color, and religion (7.96 %), making fun of with

sexual jokes, comments or gestures (13.53 %), by being left out of activities or completely being ignored (10.34 %), and by making fun of how their body or face looks (22.02 %) . (Table 1)

Family Influences

More than half (54.69%) of youth at risk reported that they have a highly functional family. This is apparent through their perception and satisfaction with the current state of their family members’ relationships in terms of adaptation, partnership, growth, affection, and resolve. Overall, three in five

Violence and Unintentional Injury	Total % (95% CI)	Gender		Age		
		Male (%)	Female (%)	11 to 12 (%)	13 to 15 (%)	16 to 18 (%)
Bullying						
Percentage of youth who were bullied on one or more days during the 30 days before the survey	27.56 (25.42, 29.77)	28.69	26.69	27.42	28.07	18.82
Percentage of youth who were bullied on one or more days during the 30 days before the survey by being hit, kicked, pushed, shoved around, or locked indoors	6.63 (4.12, 9.14)	9.41	4.35	0	6.53	16.67
Percentage of youth who were bullied on one or more days during the 30 days before the survey by making fun of because of their race, color, and religion	7.96 (5.23, 10.69)	12.35	4.35	0	8.24	8.33
Percentage of youth who were bullied on one or more days during the 30 days before the survey by making fun of with sexual jokes, comments, or gestures	13.53 (10.08, 16.98)	14.71	12.56	15.38	12.78	33.33
Percentage of youth who were bullied on one or more days during the 30 days before the survey by being left out of activities on purpose or completely ignored	10.34 (7.27, 13.42)	6.47	13.53	15.38	9.94	16.67
Percentage of youth who were bullied on one or more days during the 30 days before the survey by making fun of how their body or face looks	22.02 (17.83, 26.20)	22.94	21.26	23.08	22.16	16.67

Table 1 (continued). Prevalence of Violence and Unintentional Injury among Youth-at-Risk by Gender and Age Group, Cavite, 2015

Family Influences	Total % (95% CI)	Gender		Age		
		Male (%)	Female (%)	11 to 12 (%)	13 to 15 (%)	16 to 18 (%)
Family Functioning						
Severely Dysfunctional	7.09	7.94	6.44	6.45	6.84	11.76
Moderately Dysfunctional	38.22	38.96	37.66	30.65	38.24	43.53
Highly Functional	54.69 (52.25, 57.12)	53.1	55.9	62.9	54.92	44.71
Family Resources						
Severely Inadequate	1.54	2.26	1.01	0	1.62	1.3
Moderately Inadequate	37.94	34.34	40.63	40	37.52	44.16
Adequate	60.51 (58.07, 62.92)	63.4	58.36	60	60.86	54.55

Table 2. Prevalence of Family Influence Among Youth-at-Risk by Gender and Age Group, Cavite, 2015

youth (60.51%) reported that they have adequate family resources. (Table 2)

Protective Factors

In terms of school attendance, about 20.75% of youth had one or more days of unexcused school absences during the 30 days before the survey. Only 4 out of ten (44.27 %) perceived social support at school through the kindness and cooperation of the students most of the time or always. In terms of parental regulation and monitoring, most of the time or always, their parents or guardians monitor their academic

performance by checking on their assignment (21.58 %) , understood their emotional problems and concerns (35.85 %), really knew of their activities during their vacant time (40.47 %), and checking on their things without their consent (11.55 %) during 30 days before the survey. (Table 3)

Association Between The Family Influences and Protective Factors And Violence and Unintentional Injury

Family functioning, family resources, and school attendance are associated with physical attacks among youth - at - risk{

Protective Factors	Total % (95% CI)	Gender		Age		
		Male (%)	Female (%)	11 to 12 (%)	13 to 15 (%)	16 to 18 (%)
School Attendance						
Percentage of youth who missed classes or school without permission one or more days during the 30 days before the survey	20.75 (19.49, 23.49)	24.18	19.44	8.2	21.67	27.91
Perceived Social Support at School						
Percentage of youth who reported that most of the students in their school most of the time or always were kind and helpful during the 30 days before the survey	44.27 (41.87, 46.70)	43.1	45.17	45.9	44.69	36.05
Parental Regulation and Monitoring						
Percentage of youth who reported that their parents or guardians most of the time or always checked to see if their homework was done during the 30 days before the survey	21.58 (19.58, 23.58)	25.11	18.89	32.79	21.76	10.47
Percentage of youth who reported that their parents or guardians most of the time or always understood their problems and worries during the 30 days before the survey	35.85 (33.51, 38.18)	31.38	39.24	42.62	36.44	20.93
Percentage of youth who reported that their parents or guardians most of the time or always really know what they were doing with their free time during the 30 days before the survey	40.47 (38.08, 42.86)	36.49	43.48	40.98	40.88	32.94
Percentage of youth who reported that their parents or guardians most of the time or always went through their things without their approval during the 30 days before the survey	11.55 (9.99, 13.11)	12.89	10.53	9.84	11.68	10.47

Table 3. Prevalence of Protective Factors among Youth-at-Risk by Gender and Age Group, Cavite, 2015

Table 4). The odds of physical attack are 1.73 (p value = 0.019) and 1.61 (p = <0.001) times, respectively, among youth with severely dysfunctional and moderately dysfunctional families compared to youth with highly functional family . Likewise, it

was 2.96 (p = 0.017) times more likely that youth with severely inadequate family resources would experience physical attacks compared to those with adequate family resources. The odds of being physically attacked was 1.61 (p = <0.001)

Variable	Coefficient	Std. Error	Odds Ratio	95% Confidence Interval		p-value
				Lower	Upper	
Family function						
						<0.001*
Severely dysfunctional vs highly functional	0.549	0.235	1.732	1.094	2.743	0.019*
Moderately dysfunctional vs highly functional	0.475	0.125	1.608	1.259	2.055	<0.001*
Family Resources						
						0.029*
Severely inadequate vs Adequate	1.086	0.454	2.963	1.218	7.211	0.017*
Moderately inadequate vs Adequate	-0.098	0.125	0.906	0.71	1.158	0.431
School attendance						
Missed classes vs did not missed classes	0.478	0.136	1.613	1.234	2.107	<0.001*
Constant						
	-1.216	0.092	0.296			<0.001

Table 4. Association Between The Family Influences and Protective Factor and Physical Attack Among Youth at Risk

*Significant at 0.05 level

times more likely in youth who missed classes without permission compared to those who attend classes.

Likewise, family functioning , family resources, and school attendance are associated with serious injuries among youth a risk. The odds of serious injuries was 1.38 (p = 0.007) times more likely in youth with moderately dysfunctional families than in those with highly functional family .Youth with severely inadequate family resources were 2.57 (p = 0.039) times more likely to experience serious injuries than those with adequate family resources . It was 2.32 (p = <0.001) times more likely that youth who missed classes without permission would experience serious

injuries compared with those who attend classes (Table 5).

There is an association between bullying and family functioning and perceived social support at school among youth at risk. In terms of family functioning, it was 2.45 (p = <0.001) and 1.53 (p = 0.001) times more likely than youth with severely dysfunctional and moderately dysfunctional families, respectively, would experience bullying compared to those with highly functional families. The odds of bullying was 1.49 (p = 0.004) times more likely in youth who never perceived that most of the students in their school are kind and helpful than in those who have social support at school (Table 6).

Variable	Coefficient	Std. Error	Odds Ratio	95% Confidence Interval		p-value
				Lower	Upper	
Family function						0.027*
Severely dysfunctional vs highly functional	0.165	0.233	1.18	0.748	1.861	0.477
Moderately dysfunctional vs highly functional	0.32	0.119	1.377	1.091	1.738	0.007*
Family Resources						0.064
Severely inadequate vs Adequate	0.942	0.455	2.566	1.051	6.266	0.039*
Moderately inadequate vs Adequate	-0.094	0.119	0.91	0.721	1.148	0.427
School attendance						
Missed classes vs did not missed classes	0.843	0.131	2.324	1.799	3.003	<0.001*
Constant	-0.871	0.085	0.418			<0.001

Table 5. Association Between The Family Influences and Protective Factor and Serious Injuries Among Youth at Risk

*Significant at 0.05 level

The current study showed that family functioning is associated with the youth's experience of having been physically attacked and being seriously injured one or more times during the 12 months before the survey, and being bullied during the 30 days before the survey. These results are consistent with other studies which underscored that healthy family functioning protects youth-at-risk from interpersonal violence. The youth are protected from being involved in violence and unintentional injuries when the family relationship is based on family cohesiveness, there is positive support within the family, and the relationship within the family is built on love and mutual respect. The youth at risk are satisfied with the current state of their family members' relationships. One of the salient characteristics of a Filipino family is their resilience. When significant life events

pose a crisis, the family will maximize the resources available within and outside of the family system. Decision-making and responsibilities are shared among family members. A loving and caring relationships bind the Filipino family. Current pieces of evidence suggest that "family social support, family cohesion, and non-hostile parenting practices are all protective factors of interpersonal violence among youth. There is evidence that strong family support and connectedness can be protective against the perpetration of child abuse and neglect, youth violence and bullying." 8-10 "The World Health Organization supports that family dysfunction and low social cohesion within the community –place some children at much greater risk than others." [11]

The findings of this study also imply that family resources are associated with

Variable	Coefficient	Std. Error	Odds Ratio	95% Confidence Interval		p-value
				Lower	Upper	
Family function						<0.001*
Severely dysfunctional vs highly functional	0.896	0.219	2.451	1.596	3.764	<0.001*
Moderately dysfunctional vs highly functional	0.425	0.123	1.53	1.203	1.946	0.001*
Perceived Social Support at School						
None vs With Social Support	0.343	0.12	1.49	1.115	1.782	0.004*
Constant	-1.419	0.107	0.242			<0.001

Table 6. Association Between The Family Influences and Protective Factor and Bullying Among Youth at Risk

*Significant at 0.05 level

violence and unintentional injuries among youth at risk. "Individuals and families living in some communities where there are many risk factors and structural causes of disparity like high poverty are more likely than those living in other communities to experience multiple forms of violence. Families with few resources and who live in underprivileged areas have more difficulty providing their children with an upbringing that will keep them away from deviant and at-risk behavior." [12]

This study also implied that school attendance protects youth at risk from being attacked physically and sustaining serious injuries. The results of this study find evidence to support that "youth who feel connected and committed to school are at a lower risk of harming others through youth violence and bullying. Also, youths' association with prosocial peers has been shown to be protective against the perpetration of youth violence and

bullying." [13]. "School climate is significantly correlated with school attendance and health behavior. Young people who feel connected to their school are less likely to engage in a range of health risk behaviors." [14]

Perceived social support at school protects the youth from bullying. "The aspects of an individual's relationships and interactions with others can also place them at higher or lower risk for experiencing violence. This finding is consistent with studies showing that a higher level of peer support is significantly associated with a reduced risk of bullying victimization. Support of peers can function as protective factor to promote psychological well-being of adolescent school students under adverse condition ."[15]

CONCLUSION

The youth were at risk of violence and unintentional injury. During the 12 months

before the survey, 29.31 % were physically attacked, 29.48 % were involved in physical fights, and 36.84 % were seriously injured. The prevalence of bullying among youth was 27.56 %. More youth had highly functional families and adequate family resources. The prevalence of protective factors such as parental regulation and monitoring among youth at risk is notably low. Family functioning, family resources, and school attendance were associated with physical attacks and serious injuries among youth at risk. Perceived social support at school and family functioning are associated with bullying among youth at risk. It is recommended that in designing a school-based Violence Prevention Program using culturally appropriate, gender-based, and human rights-based approaches, focusing on predictors of violence and unintentional injury among youth-at-risk mainly family functioning, family resources, and protective factors may prove useful. Parents, family, and community engagement should be integrated into the program. The schools should ensure and promote a supportive, nurturing, and positive environment that explicitly supports the physical, mental, emotional, and social well-being of youth at risk.

ACKNOWLEDGMENT

This study was made possible by a Research Grant from Health Research and Development Consortium Region IV-A, Philippine Council for Health Research and Development, Department of Science and Technology. This project would not have been successful without the invaluable support and assistance of the School Division Superintendents, Principals / Academic Heads, students, and staff in participating public and private high schools in Cavite.

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Stakeholders' Perspectives on Improving Public Health Education: Preliminary Findings of a Master's in Public Health Curriculum Review

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Abstract

Background: An important undertaking for educational institutions in public health to address the evolving public health conditions is the continuous quality improvement through curriculum review and evaluation. The newly established Master's in Public Health (MPH) program of the De La Salle Medical and Health Sciences Institute (DLSMHSI) is committed to improving its curriculum to be responsive to the health needs of the public and future public health practitioners.

Methodology: Two online focus groups were conducted among faculty members and students to elicit their feedback and perspectives on the ways, approaches, and ideas for the improvement of the MPH curriculum. Focus groups data were analyzed using thematic analysis. The Stufflebeam's Context, Input, Process, and Product (CIPP) model was considered as a framework in the conduct of this review.

Findings: The findings indicate some important considerations for improvement of the MPH curriculum. It includes taking into account the public health trends by incorporating essential public health topics, ensuring specialization through elective courses, and maximizing and addressing the challenges of online mode of teaching and addressing its challenges. The outcomes of the initial implementation of the MPH curriculum have yet to be realized.

Conclusion: Preliminary observations and experiences of students and faculty members in a newly established master's program are essential to be elicited to provide suggestions in its formative development. Proposed changes, however, must be consistent with competency standards in public health education. To assure implementation of these proposed changes, its

alignment with MPH program outcomes must be ensured; though revisions of the original program outcomes may be necessary to accommodate the evolving conditions in public health.

BACKGROUND

Implementation of educational programs is continuously evolving. In public health education, pedagogical approaches are becoming complex and developing significantly such as the increasing need for online or blended learning modalities [1]. In public health practice, the utilization of meta-data is becoming more important in the formulation of many public health policies [2, 3].

The MPH program of the DLSMHSI that started its operation in August 2020 underwent a curriculum review in which feedback and inputs of faculty members, and students were elicited for the improvement of the program. This review is also essential since the program has been offered in purely online teaching mode due to restrictions caused by the COVID-19 pandemic, although it was designed to be offered in a blended-learning environment.

Every curriculum review should take into account the specified *program outcomes* as important considerations. The MPH program outcomes include demonstration of advanced competencies in, (a) partnership and collaboration for effective health service delivery; (b) development, implementation and evaluation of public health programs and policies through the application of scientific reasoning; (c) creative innovation and translation of evidence to public health practice; (d) effective communication with relevant stakeholders in both the private and public sectors; and (e) commitment to community service and social accountability towards the improvement of health outcomes.

This curriculum review aimed to identify the important processes, strategies, and ideas for the improvement of the MPH curriculum in relation to the above program outcomes and other developments in the field of public health.

METHODOLOGY

The Stufflebeam's Context, Input, Process, and Product (CIPP) model [4] informed the conduct of this curriculum review. The *context* refers to the environment in which the curriculum is being implemented such as the educational needs and public health problems. The *input* refers to the factors in meeting these educational needs in the achievement of the curriculum goals. The *process* refers to the teaching and learning strategies, and related processes. The *product* refers to the intended or unintended outcomes of the curriculum.

Data Collection

The data collection for this review was conducted in July 2021. All faculty members and students were invited to participate and only those who attended the focus groups consented to participate. Two online focus groups were conducted to collect feedback and perspectives from faculty members and students about the curriculum. The first focus group was attended by 6 faculty members. The other focus group was composed of 10 first year students. These focus group discussions were facilitated by an expert in curriculum development who is also a qualitative researcher. Focus groups questions were formulated by the Dean, Program Director, and FG Facilitator in accordance with the CIPP model.

The focus groups discussions were audio recorded with consent from the participants for documentation. The recordings were transcribed verbatim by a member of the research team. Audio recordings and transcription documents were stored safely wherein only the research team members have access to these.

Data Analysis

Thematic analysis [5] was used in making sense of the collected focus groups data. This process started by the reading and re-reading of the transcriptions to familiarize the data. The initial coding process was conducted by a member of the research team by identifying key ideas that relate to the broad question: *“What are the important strategies, approaches, and ideas that contribute to the improvement of the MPH curriculum?”*. To refine the initial codes, five (5) meetings of the research team were conducted by reviewing and discussing the appropriateness of these codes. Some possible implications of these initial codes were also discussed in these meetings relevant to the MPH curriculum improvement.

The codes were reviewed and further refined by an external research assistant. All

codes that were similar to each other were eventually grouped together to formulate phrases or words that encompass the ideas of every group of codes. This process resulted in the identification of themes. Each generated theme was provided with a description that summarizes the meaning of the codes within it. Examples of relevant quotes were presented to support each theme. A member of the research team also reverted to the verbatim transcriptions to identify additional examples of quotes that help illustrate the themes. Quotes were translated into English in cases where these were mentioned by the participants in full or partly Filipino.

Additional four meetings of the members of the research team and the research assistant were conducted to further refine the codes and themes. The draft of the findings section was eventually written up by the external research assistant.

FINDINGS

The main findings, presented as themes, were categorized in accordance with the CIPP model. Presented in Table 1 are the number of generated themes per component of the model. (Table 1).

CIPP component	No. of Themes
Context	3 themes
Input	4 themes
Process	5 themes
Product	3 themes

Table 1. Frequency of generated themes in each component of the CIPP model

CONTEXT

Responsive with the current public health trends

The respondents indicate that the program implementation should take into consideration the current public health situation. The program should give special attention to the trends in public health such as topics that involve analysis of real-world evidence and real-time processed data output. Specific course electives such as “Health Technology Assessment” and “Data Science in Public Health” enticed and encouraged one student to enroll in the program.

Health Technology Assessment and Data Science are very relevant nowadays as there is a lot of data and epidemiologic rates on COVID-19...but this is also relevant even beyond the pandemic.

The respondents also observed that many policymakers sometimes do not appreciate the knowledge and theory behind health research. This made them highlight the need for more opportunities for students to learn health communication in influencing policy making.

Each time you must deal with politics and policymakers, more often than not, the knowledge and understanding [of the effects of policies on health] do not translate to them. We should focus on how we [as public health professionals] can balance politics and health.

We must find ways on how we can weigh in and balance the wants of the stakeholders in the country.

Students’ basic knowledge

The faculty respondents deem that students must have foundational knowledge before taking specific courses to focus the class discussion on the more advanced concepts. Two faculty participants presented their

perspectives on the need for students to have basic knowledge in public health.

They have to have at least some management background...if they don’t have such a background, then how can we fill it up?

You [lecturers] have to make sure that before they go to a higher level of health economics, they have the knowledge of basic principles of economics.

Class diversity

The student participants pointed out how diversity in terms of region or location in their batch helped them address multiple case studies and assignments from varied perspectives of students coming from different disciplines. However, they emphasized the importance of other health care professionals such as nurses to improve their learning experience as they acknowledge the contribution of other professions in the different discussions.

What I really like about my classmates is that we partake in the discourse during discussions. We become very engaged when it comes to asking questions and discussing topics. I see it [diversity] as an opportunity to learn.

We [batch of MPH students] may not be very diverse in terms of profession. It is a disadvantage that we have no nurses, who are more adept in community health.

At the same time, they also express interest in learning from each other, and this is because they still have a commonality even though they are diverse.

Input

Adding specific topics

In recognition of the current trends in public health, the faculty members stated the need to incorporate additional topics to the

curriculum such as policy development, health governance, and regulatory science. Adding policy development related topics strengthen students' knowledge, especially in addressing policy gaps and aligning with the government's focus on important health policies.

We can offer the students particular topics on policy development especially in the context of universal health care.

It can be integrated, or it can be separate depending on how we put it in the whole context of the public health system.

Another proposal was to include topics on regulatory science which was deemed as a possible advantage by the faculty members as, to their knowledge, no university or tertiary academic institution in the country currently offers a specialization in this field, even more so integrating this with public health.

I think we have no specific courses on licensing and regulations specific for regulatory officers working at the Food and Drug Administration or any licensing bureau. I think it is worth considering also in the future.

The participants view that the mentioned public health topics need not be a separate course but can be integrated into existing courses.

I think it would be better [right now] to not offer it [health communication] as a separate course. Health communication can be integrated with health promotion.

If it goes well and the feedback is good, we can recommend it for implementation in the next batches [of MPH students].

Maximize technology and resources for teaching and learning

Both students and faculty members acknowledge the importance of utilizing the available teaching and learning technology. Some faculty members mentioned that teaching in an online setting could be made easier by adapting new technologies and methodologies, and by giving feedback through emails and group chats. The students also feel that more online resources (e.g., Turnitin and Grammarly) should be made available to help them with their academic requirements.

As a professor, I really have to embrace the technology or the new methodologies so we can have more lively and more sustainable discussions online.

On our part as faculty, well, we should go through the resources available in the library.

Since this program is conducted mainly online, we should focus more on resources that promote learning in that environment ... every student should have access to Turnitin or Grammarly, or similar applications to help them accomplish requirements.

Although there are some concerns in the use of these resources, the two groups highly recommend maximizing their use through reorientation, capacity building sessions and user-friendly instructions on the available resources provided by the institution.

It may be because I am new to the technology, but I cannot maximize it yet. Maybe [we can have] more practice [sessions] on the use of resources or more [access to] guide[s] on how to access.

To facilitate the utilization of library resources, instructions on how it is used should be made available all the time.

Students need a reorientation of available resources provided by the institution.

[It would be good] if we could be reoriented [on available resources] or a contact person is provided [for that matter].

Specialization through electives

Some participants view that the lack of specific tracks or specialization of the program may lead to graduates with too generalized knowledge in public health. The faculty participants perceived that the program needs to offer specific electives to help the students choose the specific field they want to master.

The students can have tracking through electives. We could offer specific electives that could help them go forward.

As we evolve the program, I hope that we can have a more specific track for enrollees. It could also help them think about what field of public health they pursue.

However, one particular concern with the offering of a range of elective courses is the need to have a broad pool of faculty members.

In other universities, there are electives that you can choose. For example, you can select that all your electives fall under epidemiology. However, that could mean that they already have a rich [pool] of faculty and subjects.

Systems thinking approach

The faculty respondents suggested that the students need to learn the systems thinking approach and how this can be applied in various settings of tackling a health issue or problem. This also includes learning how to collaborate with other professionals.

We want to inculcate to our students the health system thinking approach, instead of the fragmented programmatic process [to problems].

As the systems thinking approach to policy making involves topics on policy development, the faculty feels that there is a need for students to be exposed to how policies are being done from the government's perspective.

I guess they need a background in policy development because many public health activities also involve policy development.

[They] need more insights on how the government works [in terms of its processes and approach].

Process

Ensuring application of theory

The students expressed the need for more avenues to apply the theories that they have learned in their classes. The most prominent example that the students mentioned is doing fieldwork in the form of a community immersion.

In my opinion, right now, one of the skills that graduates [of the MPH program] would be lacking is field expertise. Thus, the students should have more opportunities for practicing theories in the field.

It's difficult if [teaching] is more theoretical, but if [the approach] is more practical we can better retain the information.

The students also feel that they lack the relevant experiences in public health if there is no opportunity to apply theory before graduation.

We cannot translate into practice [the theories that we know] ... we have this apprehension that we might not be able to deliver what is expected of us after graduation and getting hired.

Sustaining online class

Although there are some challenges in the online classes such as distractions during the synchronous classes and limited network connectivity, students gave emphasis on a teaching approach that involves practical exercises in addition to the theories discussed in online classes.

If it's a more practical approach [in handling] problems, [I feel that] we could give more inputs given that we are studying master's in public health.

One problem in online classes is the low attention span of students. One solution that I can think of to address this is to engage and stimulate the students [through class exercises].

While long synchronous sessions may not be optimal for students, faculty members stated that these sessions help them respond directly to students' concerns and also allow the students to hear the outputs of their classmates.

The synchronous sessions worked for us [faculty and students] since it became an opportunity for students to share their [outputs on] assignments or group activities.

We assist them or guide them in the development of their capstone projects.

Varied teaching approaches

The faculty respondents believe that the utilization of various teaching modalities can better facilitate learning. Using only one teaching modality (e.g., lectures only) may hamper learning since the MPH program is offered in a blended learning environment. Currently, faculty members employ case analyses, essays, debates, practical exercises, oral presentations, among others.

A teaching strategy that worked was giving them exercises to make an

operational plan or a problem tree analysis.

We asked the students to choose a community or select a population group that is accessible to and design a health promotion plan for that specific group or community.

They further mentioned that students appreciate it when outputs build on each other throughout the course.

The outputs are building on each other. They appreciate it in the end that they have this one major output.

Alternative MPH formats

The faculty members also suggested alternative format and offerings under the MPH program. One suggestion was offering a ladderized format for the MPH degree in which minimum requirements (e.g., professional experience of 1-3 years) shall be set for eligible students for advanced entry. However, students participating in this format should still take identified core courses for MPH degree holders.

Internationally, they look at one-to three-year experience in public health

I would suggest identifying the basic courses that students have to take whether they are advanced or not. These courses should be the concepts that the students should learn in the degree.

The faculty also raised the possibility of offering certificate or short course tailored for non-health professionals (e.g., legislators, local executives, etc.). This market can be tapped as Philippine universities currently offer MPH to health professionals only.

I think it would be good if we open [the study of Public Health] to all others. I know some local executives, mayors, and legislators

of local councils who are equally interested.

So far, in the Philippines, it is required to be a health professional. One center partnered with different universities and targeted regions, the mayors and midwives, [in the conduct of their certificate or short courses].

Product*Students as potential influencers*

The faculty reported that some students mention that even though they are not yet in a position to be decision-makers in their workplaces, they are already effecting change. The faculty recognizes the current potential for the students to be influencers in their current area of practice.

There really are gaps in policy and its implementation. Having realized this, I thought that our students could also be influencers in their own sphere of influence.

The students have a lot to share about the problems but at the same time they also see the position and the opportunity to do something about the gaps that they identify... They can also provide influence in terms of health communication.

I think that it is a good idea that we can make them realize that even if you are not the ones who are in control of the budget, in control of policies, etc. There are still things that they can do at their level.

Upskilling in research and program management

The faculty emphasized enhancing the research and project management skills of the students by helping them become better writers, evidence-based practitioners, and idea innovators. They also mentioned that these skills are essential in all fields of public health.

I think research skills should be inherent in all students taking masters. It should be honed in little assignments that they do.

I am hoping that we can have better writers. I am speaking from my experience in checking their outputs, their ability to appraise evidence or write what they have in mind.

In my experience in checking their capstone projects, they need to have better research skills. They can start with [improving] their writing skills. I hope they have a successful capstone project because through this exercise, they can become better program managers... I hope that they are given the opportunity to undergo somewhat [like a] mentorship [in] doing their capstone projects.

No matter what path they take, I think these skills would be very useful for them

They also hope that the students, as future public health professionals, can contribute meaningful research that will support the implementation of the Universal Health Care (UHC) Act and the detrimental effects of the pandemic on the health status and outcomes of the country.

The Health Systems [course] can be reformed...our students can also contribute into thinking of what would be the appropriate approaches and systems to make Universal Health Care work.

There's a lot of requests for studies [on the effects of the pandemic]: rethinking about the culture, rethinking about the behavior, changed behaviors, and rethinking about social factors that may affect compliance.

Course Satisfaction

The students reported that the delivery of courses met their expectations in terms of

the scope, teaching strategies and faculty credentials.

For me, the [course] Foundations of Public Health gave us a good background on what [the role of] public health is. It served as a good foundation for knowing more about public health.

The degree program is okay such that we feel that the tuition is worth it because our professors really impart their knowledge to us. Our professors are definitely of high caliber.

DISCUSSION

In consideration of the CIPP model, significant findings on the suggested processes and approaches to help enhance the implementation of the MPH curriculum are discussed in this section. The identification of the participants on some public health trends that can be addressed by adding topics in public health in the curriculum are related to the contextual factors. Inclusion of these topics may contribute to addressing specific needs of the students in particular, and the public health sector in general. Specialization in the program as well as experiences in online teaching are input-related matters. Maximization of the available resources is a process-related finding. Product refers to the improvement in competencies such as in research and expression of students' appreciation of the credentials of lecturers.

Adding PH topics consistent with the trends. There are various topics suggested by the participants to be incorporated in the MPH program such as interprofessional practice, health policy, and systems thinking. These topics are consistent with the foundational competencies indicated by the Council on Education in Public Health (2016) foundational competencies. Furthermore, health policy is a commonly identified

competency in the graduate studies in public health [6, 7]. There could be many other topics that are possible to be included in the MPH curriculum, but prioritization should be based on the current trends in public health. For example, Ros et al., [8] suggest a data-driven framework to prepare for future public health crises, implying the importance of data analytics in public health. Furthermore, the MPH program, to be more relevant, needs to dwell on health equity as [9] presented that nations need to address the long term impact of the pandemic that heightened social health inequity.

On public health specialization. The non-offering of specific areas of concentration in the MPH program could be a concern among the student respondents. However, it was pointed out by the faculty respondents that a certain level of specialization could be achieved through the offering of elective courses as well as the specific topic of the students' capstone project or thesis. Further, one explanation of not offering a highly specialized MPH program could be related to the idea that public health employment in the Philippines, such as in the Rural Health Units or Department of Health -- in which roles and responsibilities do not usually focus in one specific area of public health but usually on varied public health concerns or programs. Furthermore, there is a need to clarify, in some parts of the curriculum, the career opportunities after finishing the program, despite no specific concentration for the MPH program.

The need to combine online and in-person teaching. While online mode in teaching and learning is beneficial to many, there have been several related challenges that can be derived from the experiences of the participants. The potential of online mode may not have been fully maximized. This could be related to the limited technical

know-how of many lecturers about this mode of teaching, though these could be addressed by reorientation or training/workshop sessions on the use of online teaching. Participants also pointed out the presence of various distractions that could be concerning in online teaching and learning. Another downside of online teaching is limited practical experiences on some matters related to competency development. For example, the Field Practice course of the MPH curriculum could be an opportunity for students to observe and apply certain public health skills, but because this is not possible during the pandemic, an online approach to teaching competencies in this course is being done. These practical experiences may be necessary in terms of learning several concepts and processes around public health. Furthermore, while online learning is considered as compatible with graduate students who are professionals as it allows balance of studies, and work and family activities, Aleem et al., [10] suggest combining online learning with in-person academic activities.

On the maximization of resources. There are various resources available for the implementation of the MPH curriculum. One of the most common is the availability of online resources such as online journals and books, and the Learning Management System (iLS Blackboard) for the use of faculty members and students. Although utilization is evident, it shows the necessity to specify how these resources could be fully maximized by everyone in the MPH program.

On the product of the curriculum. There are few indications of the outcomes of the curriculum implementation. Participants' expression of the possible improvement of competencies such as in research as well appreciation of the credentials of the faculty

members are indications of the initial outcomes. The latter may indicate satisfaction in the quality of teaching of the lecturers. However, it may take some time to generate, in more concrete terms, the impact of the MPH curriculum implementation. This might necessitate for the first cohort of the MPH students to finish the program, to fully uncover various products of the MPH curriculum implementation. Thus, this curriculum review is considered to have generated only preliminary findings.

CONCLUSION AND RECOMMENDATIONS

Newly established master's programs are essential to undergo curriculum review in support of its formative stage of development. This is to allow the necessary changes to be made including those items not considered during the conceptualization of the program. Changes that need to be done in the MPH curriculum should be based on the current trends and public health competency standards or guidelines. Though this curriculum review is considered preliminary, additional basis for possible curriculum improvement could be based on the careful evaluation of the curriculum implementation especially for the period after the data collection for this curriculum review. Additional program outcomes might be necessary to be articulated in the light of the current public health crises and future direction.

ACKNOWLEDGMENT

We are grateful to the faculty members, and students of the Master's in Public Health (MPH) program of DLSMHSI who provided their valuable insights in the focus group discussions for this curriculum review. We thank A/Professor Reeva Ann L. Sumulong who facilitated the two FGDs, and Mr.

Patrick James C. Encarnacion, our external research assistant, for the review and refinement of codes, development of tentative themes, and in writing-up the draft results section of the curriculum review report where this manuscript was derived. Our deepest gratitude to the Vice Chancellor for Academics Dr. Juanito O. Cabanias for the unending support and encouragement to the Graduate Studies in Medical and Health Sciences (GSMHS).

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Teaching Strategies That Can Improve Knowledge Retention In Human Anatomy

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ABSTRACT

Background: Learned concepts in anatomy is important for the development of clinical competency in medicine. Students in clinical years are criticized to have forgotten anatomy. With innovative teaching strategies like flipped classroom, will this be able to improve retention?

Objectives: This study has investigated knowledge retention and loss in anatomy. This also compared the effect of traditional and flipped classroom strategies in the retention of basic anatomical and clinical correlation concepts using computed knowledge loss percentage (KLP)

Methods: This is an experimental study conducted among first-year students, administered with a 32-item test before, after the neuroanatomy module, and was followed-up after 5 months post-instruction. Mean difference in scores between testing periods were analyzed using paired samples t-test. The computed KLP was used to determine the degree of knowledge loss among the 2 combined determinants; teaching strategies (traditional and flipped classroom), and knowledge level (basic concepts and clinical correlates).

Results: Knowledge gain was demonstrated post instruction and decay was observed 5 months after (KLP=5.65). Higher knowledge loss was observed in traditional lecture (KLP=20.08) as compared to flipped classroom (KLP=11.26). Likewise, basic knowledge decays faster (KLP=23.97) as compared to clinical correlation (KLP=4.5). Basic knowledge instructed in a flipped classroom (KLP=16.13) and clinical correlation taught in traditional lecture (KLP=3.16) showed lower KLP.

Conclusion: Knowledge gained post instruction was shown to decay overtime. To reduce the effect of knowledge loss, basic knowledge must be taught using the flipped classroom strategy and traditional lecture for clinical correlation.

Keywords: knowledge loss, clinical correlation, flipped-classroom

BACKGROUND

Learned concepts in basic sciences, including Human Anatomy is an important tool for the development of clinical competency especially in the later years of medical education, where students are engaged with actual patients and expected to come-up with a logical diagnosis and formulate a comprehensive management plan. "Students do not know their Anatomy!" is a common complaint among clinical faculty teaching senior students in medicine program. Scenarios like student inability to name the bone structure affected in a fractured leg, inaccurate anatomical diagnosis, difficulty in recognizing abnormal radiographic images, are just few instances demonstrating loss in the learned anatomical concepts.

The De La Salle Medical and Health Sciences Institute-College of Medicine (DLSMHSI-CM) is one of the private higher education institutions offering a 4-year Doctor of Medicine program. It implements an integrated subject-, problem-based, and community-oriented curriculum and courses consisting of basic and clinical sciences. Human Anatomy course is offered in the 1st Year Level comprising of 41% (592 hours of didactic and laboratory sessions) of the total academic load of the entire level. The course has four (4) individual sections, namely Histology, Embryology, Gross Anatomy, and Neuroanatomy. The Anatomy curriculum is composed of twelve (12) modules sequentially designed in such a way that concepts build from the simple basic unit of life, i.e., the cell, to a more complex organ-system level. Administration of a summative end-of-module assessment at the end of each module serves to measure gained knowledge from the instruction. The lecture is still the mainstay of instruction, and topics are usually coupled with a laboratory session where actual identification of anatomical structures, with emphasis on clinical

correlation, application to physical examination, and concepts relevant to clinical practice.

Neuroanatomy is the last module in the Anatomy course. It is usually offered around the 1st week or 2nd week of April until the 3rd week of May. Baseline knowledge in the module is measured using a 50-item diagnostic examination. There are 11 individual topics in this module, namely (1) General Organization of the Nervous System, (2) Meninges (3) Ventricular System, (4) Circulation, (5) Cerebrum and Diencephalon, (6) Brainstem and Cranial Nerves, (7) Spinal Cord and Pathways, (8) Motor System, (9) Limbic System, (10) Neuroanatomy of Language and (11) Special Senses and lecture (large group setting) is the mainstay of instructional delivery in most of the topics.

In the Academic Year 2019-2020, there were four topics delivered in Flipped-Classroom format; these are meninges, ventricular system, circulation, and spinal cord and pathways. Created video lectures for these 4 topics were uploaded in the school's Learning Management System, which allow students to access the materials anytime. Three weeks before the scheduled session, students are instructed to access the video lectures, and they were all informed that a short quiz, related to the topic, will be administered at the beginning of each session. During the face-to-face encounter, a 10-20-minute review of the content of the online video is conducted. During the session, students were given the chance to ask questions about concepts encountered that were not clear or quite confusing during the online video lectures. After the review, the remaining time will be allotted for clinical correlation and application.

Students were promoted to Year Level 2 only if they were able to comply with the requirements set for Year Level 1, i.e., passing all the first-year subjects. A

shift from normal and physiologic concepts to diseases and the introduction of abnormal structures happens in this particular year level. The courses offered in level 2 are Pathology, Microbiology, Pharmacology, and Physical Diagnosis. Unfortunately, the Pathology of the nervous system is taken up in the last module of the course (similar to 1st year), and only then when neuroanatomical concepts are revisited.

Ideally, a student who passed the Anatomy course is assumed to have acquired at least the minimum required knowledge in the subject matter relevant to the practice of the medical profession. The student should be able to recognize anatomical problems and can easily point-out the structure/s involved given a hypothetical or actual case encounter and laboratory or radiographic images. Also, the student should be able to execute physical examination and other standard medical procedures using the concepts of surface anatomy. These sets of competencies are very much needed for a future practicing doctor in order to examine the patient and arrive at a probable diagnosis, and at the same time, come up with the appropriate management.

After the students have gone through the anatomy course, evidence revealed that significant knowledge is lost [1]. As the medical student progresses to the second level of the curriculum, they become pre-occupied with the concepts of the new courses in order to achieve high grades. The high demands and strenuous academic load of the new subjects prevent them from going back to the previous basic sciences. Though some faculty are making an effort to review past concepts, this is not always the case. Due to the assigned limited time to deliver the instruction, they are but forced to focus on the current content of their assigned topic. Furthermore, assessments are no longer aimed to

measure past knowledge, but the focus is on the current topics/subject matter. In effect, basic sciences acquired knowledge slowly decays and forgotten.

Studies have been conducted documenting a significant decrease in the learned anatomical knowledge. In a meta-analysis study, only two-thirds to three-fourths of acquired knowledge in basic sciences is retained after one-year post-instruction [1]. The period of non-usage of knowledge from its acquisition until retrieval is called "retention interval" or RI. However, a sizeable portion of knowledge is retained despite a prolonged retention interval [1]. As recall in learned anatomical concepts were noted to decline during the pre-clinical years, it was found that a significant knowledge is adequately stored in the memory bank and will require clinical reinforcements in enhancing its storage [2]. On the other hand, there are studies showing that a significant amount of learned knowledge in anatomy is not lost and remained stable 2-3 years after its acquisition especially if the course materials have utilized contextual learning methods and longitudinal reinforcements [3-5].

In the Philippines, the law mandates that all Filipino graduates of basic medical education must pass the Physician Licensure Exam (PLE) before they can practice the profession. The commissioned government agency, Professional Regulation Commission (PRC) administers the test. The scope of the PLE is composed of 12 individual subjects. Six (6) of which are basic sciences (i.e. Anatomy, Physiology, Biochemistry, Microbiology, Pharmacology and Pathology) and the remaining six are clinical specialty sciences (Internal Medicine, Obstetrics and Gynecology, Pediatrics, Surgery, Preventive Medicine and Ethics and Legal Medicine). The majority of the medical schools in the country offer basic science courses, like Anatomy, Physiology, Pathology, during the

first 2 years of medical education. However, the interval between the course delivery and licensing exam takes about 3-4 years.

In one of the data review conducted in DLSMHSI-CM on the performance of students who failed in 2016 September Physician Licensure Exam, the subjects that the majority of the examinees have a score of 75% and below are mainly basic sciences which include Anatomy, Physiology, Pharmacology, Microbiology and Preventive Medicine [6]. It shows that students are affected by the time gap between the teaching of basic sciences and the administration of the summative assessment during licensing. It also shows that due to the proximity of learned clinical subjects to clinical experiences, students have satisfactory performance as far the PLE results are concerned.

This study has investigated the extent of knowledge retention and loss in neuroanatomy (as a representative module of the Anatomy course). This paper also compared the effect of traditional and flipped classroom strategies in the retention of basic anatomical and clinical correlation concepts. Determining the effects of these factors enable the medical institutions to come up with measures that prevent knowledge loss and innovate strategies that further knowledge retention.

METHODOLOGY

This is an experimental study wherein scores attained in 3 different time periods were compared. The scores attained in the diagnostic pre-test was followed until the summative end-of-module exam scores. Further, the end-of-module scores were followed with a delayed test, which was taken 5 months after the administration of the summative exam.

The chosen population for this study are regular Year Level 1 medical student

officially registered in the College of Medicine program last Academic Year 2018-2019 who took up Anatomy Course. A non-probability, purposive-total population sampling method was used. Exclusion parameters that were used are as follows: (1) students who failed the anatomy course (with a final grade of 74.99 and below) or failure in any Year Level 1 subjects at the end of the academic year, (2) officially registered as irregular, (3) students who filed an official leave of absence during the duration of the study, (4) students who were not promoted to Year Level 2 for the AY 2019-2020, (5) qualified students who did not sign the informed consent and, (6) qualified students who intended to withdraw from the study.

At the onset of the neuroanatomy module, 4 topics were selected to be part of the study. These were (1) Meninges, Ventricles, Circulation (MVC) (2) Spinal Cord and Pathway (SC), (3) Brainstem and Cranial Nerves (BC), and (4) Cerebrum and Diencephalon (CE). The topics BC and CE were delivered using the conventional lecture while MVC and SC were delivered using the flipped classroom. In the flipped classroom topics, an online video material was created and uploaded in the learning management system 2 weeks before the scheduled session and can be viewed repeatedly and anytime by the students. In the online video material, only basic concepts related to the chosen topic was included. During the face-to-face schedule, a 5-10 minutes review of the online video material was done, and students were allowed to ask for clarificatory questions. After the clarificatory period, the faculty-in-charge discussed clinical correlation concepts that were related to the current topic using an interactive face-to-face lecture strategy. The faculty-in-charge throw questions to the students, and they voluntarily or randomly called to answer. For the chosen lectured topics, both basic

concepts and clinical correlations were all taught within the four hour period. Similar to the face-to-face engagement in the flipped session, the faculty -in-charge throws question to the class, and they voluntarily or randomly called to answer.

Testing was done in three time periods (i.e., pre-test, end-of-module, and the last delayed test) using a standardized 32-item test questionnaire lifted from a table of specification (Table 1). The 32-formulated item were tagged or assigned with identifiers. The tagging was based on 3 parameters: topic, teaching delivery (traditional lecture or flipped classroom), and question level (basic knowledge vs clinical correlation).

Consent was secured and participating students were informed that the exam would be non-recorded. At the start of the module, the first diagnostic pretest was administered using the 32-item test. After all the topics have been delivered to the class, they were given 3 days to prepare for the summative end-of-module

exam for neuroanatomy, following the schedule set in their academic calendar. The end-of-module exam had a total of 132 items. The first 100 items are the regular questions, while the 32 items are repeated questions taken from the diagnostic pre-test. The 32 individual items were randomly mixed with regular questions. Five months post-instruction, students were again retested using the same 32-item standardized exam.

Collected scores of the students were encoded using the Microsoft Excel Software. Scores of the pretest, end-of-module, and delayed tests were organized according to the overall scores of each participating student and organized based on question tagging. Mean scores for different categories and the corresponding standard deviation were computed. Statistical analysis using the Analysis ToolPak add-in of the same software was used for data analysis. Paired samples t-test was used to compare the mean score difference between two testing intervals,

	Basic Knowledge	Clinical Correlation	Total
Meninges, Ventricles, Circulation	4	4	8
Spinal Cord	4	4	8
Brainstem and Cranial Nerves	4	4	8
Cerebrum	4	4	8
Total	16	16	32

Table 1. Table of specification for the standardized 32-item exam tool

(1) pretest and end-of-module test, (2) end-of-module test and delayed testing. A 95% confidence interval and an alpha error of 0.05. T-distribution was used to determine the p-value as a basis of mean difference computation. Furthermore, the mean score difference of the two individual tested groups (interventional vs. noninterventional) was analyzed using independent samples t-test via the same Microsoft Excel Software. A 95% confidence interval and an alpha error of 0.05. T-distribution was used to determine the p-value as a basis of mean difference computation.

The pre-test mean score serves as the baseline to monitor the learning gain after instructional by comparison with the end-of-module mean score. The summative (end-of-module) mean score will now serve

as the baseline determinant of knowledge loss and retention by mean score comparison with the delayed testing. The period between the summative and delayed testing is the period of retention interval (RI). The amount of knowledge retention percentage (KRP) was computed as the quotient between final delayed testing mean score (numerator) and summative mean score (denominator) multiplied by 100%. Moreover, knowledge loss percentage (KLP) was computed by getting the difference between the mean scores of summative and final delayed testing divided by the mean score of summative multiplied by 100%. KLP is inversely proportional to KRP, thus a higher KLP translates to a high knowledge loss (Fig 1).

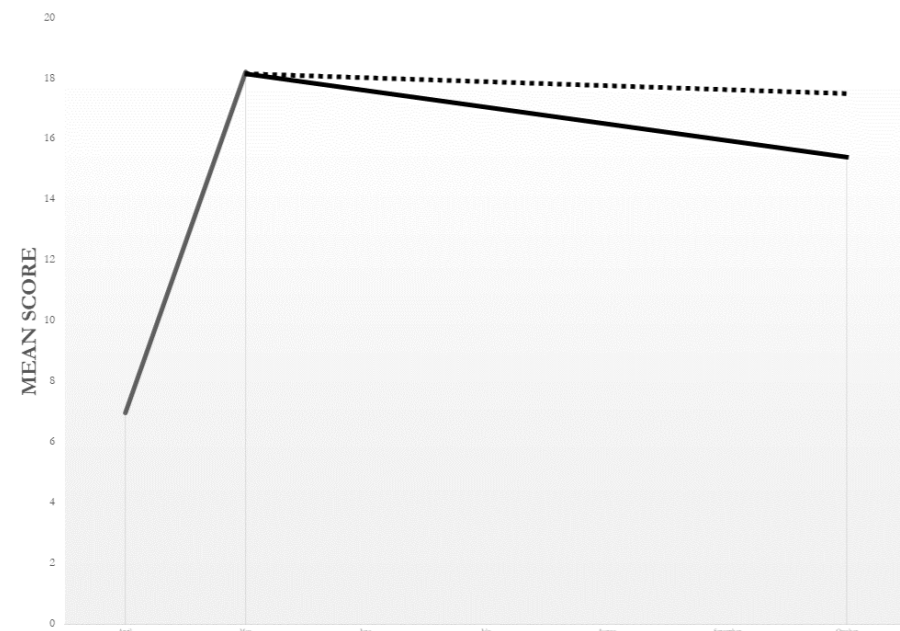


Figure 1: Basis for interpretation and formula for the computation of KLP

Formula:

$$KRP = (DTms / STms) 100\% \quad KLP = (STms - DTms) / STms \times 100\%$$

- Where: KRP = Knowledge retention percentage
- KLP = Knowledge loss percentage
- DTms = Delayed testing mean score
- STms = Summative testing mean score

RESULTS

A total of 307 1st year medical students enrolled in Anatomy qualified initially for the study and were given the informed consent form. Out of 307, 232 (75.57%) students signified agreement to be included in the study, and 75 (24.43%) students were automatically excluded from the study for non-signage of the informed consent. At the end of the academic year, 7 students were excluded due to non-promotion to Year Level 2. A total of 225 medical students, currently on year level 2, were included in this study. Among the 225 included students in the study, 88 (39.11%) are males, and 137 (60.89%) are females. Twenty-seven students (12%) are from the accelerated courses taking up BS Human Biology, Medical Biology, and Biochemistry and 205 (88%) are graduates of different baccalaureate programs. Accelerated courses are programs in which the final

year subjects of the premed course are cross-enrolled in the first year of the College of Medicine. Students who pass requirements set by the college are accepted into the Medicine program and continue to second year Medicine proper, effectively shortening the total amount of time to achieve an MD degree. Six among the 225 participants are foreigners.

Overall Result of Pretest, End-of-Module and Final Assessment

A total of 225 students took the pretest administered before the module, having a mean score of 6.97 with a standard deviation of 3.58. At the end of the neuroanatomy module, the same number of participants took the summative assessment (end-of-module test), with a mean score of 18.21, with a standard deviation of 5.11. Paired samples t-test analysis (Table 2 and Figure 2) for the pretest and end-of-module mean score

	Pairs	Mean Score	N	t	Sig
Paired T-test	Overall Total Score (pretest)	6.97	225	-34.335	0
	Overall Total Score (end-of module)	18.21			
	Overall Total Score (end-of-module)	18.21	225	7.574	0
	Overall Total Score (delayed test)				

Table 2: Paired t-test comparison in the overall mean scores of pre-test, end-of-module and delayed tests

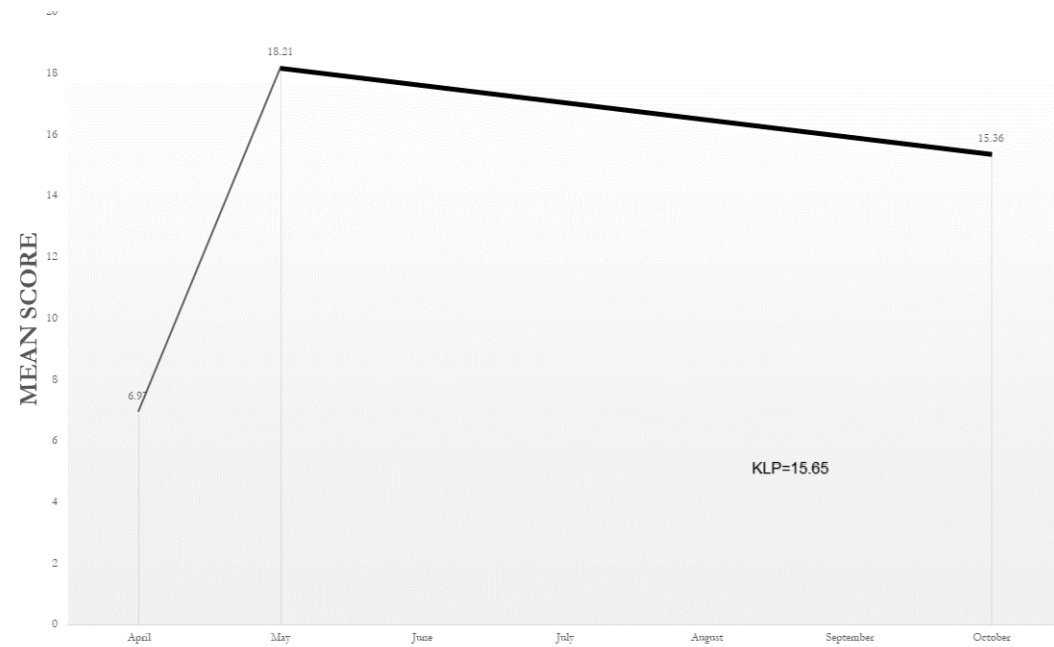


Figure 2: Overall total mean score comparison of pre-test, end of module and delayed test

shows a significant increase with a p-value of ($p \leq 0.05$). Five months post-instruction, a delayed test-retest ($M=15.36$, $SD=5.78$) was administered. Paired t-test comparison of mean scores of end-of-module and final assessment shows a significant decline ($KLP=15.65\%$) in the overall scores with a mean score difference of 2.85 and a p-value of ($p \leq 0.05$).

Result Of Scores According To Question Level (Basic Knowledge Vs Clinical Correlation)

Paired sample t-test (Table 3, Figure 3) was conducted to compare the mean scores of pre-test and end-of-module test and end-of-module tests with the delayed test according to the question level (basic knowledge and clinical correlation). There was a significant increase in the basic knowledge pre-test mean score ($M=3.39$, $SD=2.03$) and end-of-module test mean score ($M=10.43$, $SD=2.77$); $t(224)=-35.895$, $p=0.000$. Similarly, a significant increase noted in the clinical correlation pre-test mean scores ($M=3.58$, $SD=2.17$) and end-of-module test mean score ($M=7.78$, $SD=2.92$);

$t(224)=-21.898$, $p=0.000$. Furthermore, a significant decrease in mean score noted between the basic knowledge end-of-module test ($M=10.43$, $SD=2.77$) and final assessment ($M=7.93$, $SD=3.33$); $t(224)=11.763$, $p=0.000$. However, mean score difference between clinical correlation end-of-module test ($M=7.78$, $SD=2.92$) and delayed test ($M=7.43$, $SD=2.91$) is not statistically significant; $t(224)=1.638$, $p=0.103$. KLP for basic knowledge is 23.97% and 4.50% for clinical correlation.

Independent samples t-test (Table 3) was conducted to compare the mean scores of basic knowledge and clinical correlation questions. There was no significant difference in the baseline pre-test scores for both basic knowledge ($M=3.39$, $SD=2.03$) and clinical correlation ($M=3.58$, $SD=2.17$); $t(224)=-0.963$, $p=0.336$. However, post-instruction, there was a significant difference in the mean score of basic knowledge ($M=10.43$, $SD=2.77$) and clinical correlation ($M=7.78$, $SD=2.92$) during the end-of-module exam; $t(224)=9.874$, $p=0.000$. Lastly, the difference of basic

	Pairs	Mean Score	N	t	Sig
Paired T-test	Total Score-basic knowledge (pretest)	3.39	225	-35.895	0
	Total Score-basic knowledge (end-of module)	10.43			
	Total Score-basic knowledge (end-of-module)	10.43	225	11.763	0
	Total Score-basic knowledge (delayed test)	7.93			
	Total Score-clinical correlation (pretest)	3.58	225	-21.898	0
	Total Score-clinical correlation (end-of module)	7.78			
	Total Score-clinical correlation (end-of-module)	7.78	225	1.638	0.103
Total Score-clinical correlation (delayed test)	7.43				

Table 3. Paired and independent t-test comparison of overall mean scores of pre-test, end-of-module and delayed tests according to question level

	Pairs	Mean Score	N	t	Sig
Independent T-test	Total Score-basic knowledge (pretest)	3.39	225	-0.963	0.336
	Total Score-clinical correlation (pretest)	3.58			
	Total Score-basic knowledge (end-of module)	10.43	225	9.874	0
	Total Score-clinical correlation (end-of-module)	7.78			
	Total Score-basic knowledge (delayed test)	7.93	225	1.717	0.087
	Total Score-clinical correlation (delayed test)				

Table 3 (continued). Paired and independent t-test comparison of overall mean scores of pre-test, end-of-module and delayed tests according to question level

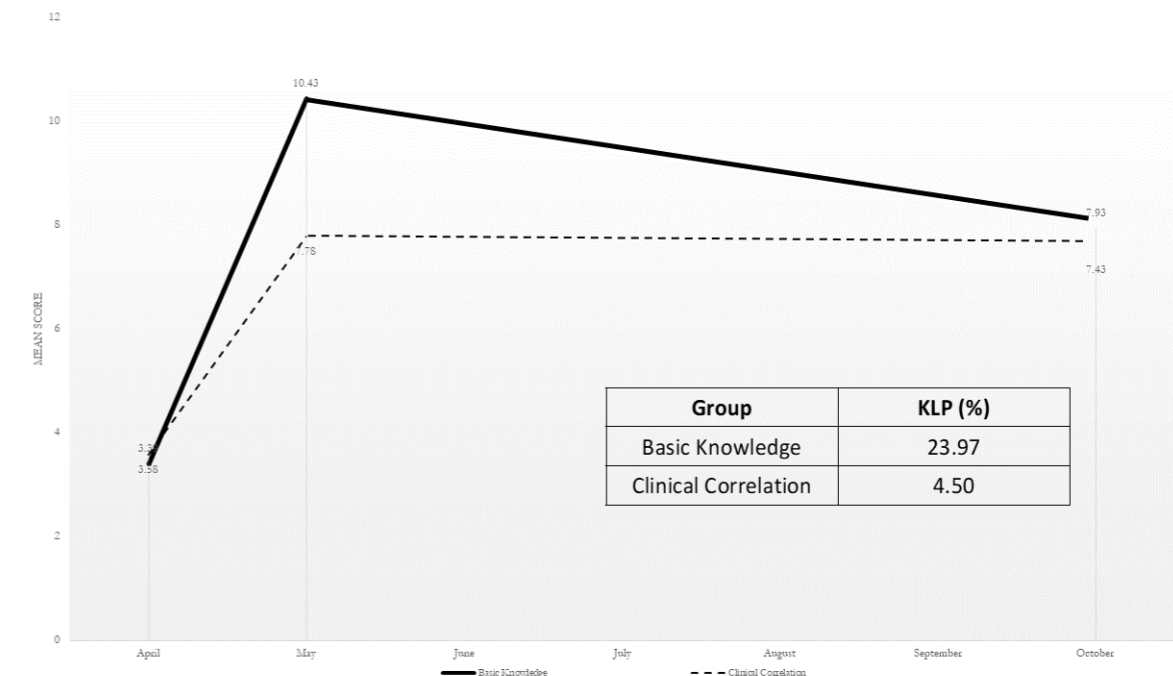


Figure 3. Overall mean scores of pre-test, end-of-module and delayed tests according to question level (basic knowledge vs clinical correlation)

knowledge (M=7.93, SD=3.33) and clinical correlation (M=7.43, SD=2.91) mean scores are not statistically significant; $t(224)=1.717, p=0.087$.

Result Of Scores According To Instructional Delivery (Flipped Vs Traditional)

For this study, 4 topics in the entire neuroanatomy session were chosen. Two of which were delivered in a flipped classroom method and the remaining 2 in a traditional lecture. Paired samples t-test was used (Table 4 and Figure 4) to compare the pre-test and end-of-module scores, and end-of-module versus delayed test scores for both flipped and traditional lecture method. For the flipped method group, there was a significant increase in the scores of pre-test (M=3.56, SD=2.18) and end-of-module test (M=9.06, SD=2.98); $t(224)=-27.784, p=0.000$. Also, a significant difference is seen between end-of-module scores (M=9.06, SD=2.98), and final assessment

scores (M=8.04, SD=3.25), $t(224)=4.566, p=0.000$. Thus, there is a significant increase in scores post-instruction for questions covering the topics that are delivered in a flipped classroom method. After 5 months of follow-up, a significant decline can be observed. For the traditional lecture method, there was a significant increase from the baseline pre-test scores (M=3.41, SD=1.86) to end-of-module scores (M=9.16, SD=2.69); $t(224)=-31.910, p=0.000$. Furthermore, the decline of scores from end-of-module (M=3.41, SD=1.86) to delayed test (M=7.32, SD=3.11) is statistically significant; $t(224)=8.857, p=0.000$. Therefore, the decline in scores can be seen for both teaching methods; however, the decline is greater in traditional lecture (KLP for flipped = 11.26%, traditional = 20.08%) strategy.

Independent samples t-test (Table 4 and Figure 4) was used to compare the

	Pairs	Mean Score	N	t	Sig
Paired T-test	Total Score-flipped (pretest)	3.56	225	-27.784	0
	Total Score-flipped (end-of module)	9.06			
	Total Score-flipped (end-of module)	9.06	225	4.566	0
	Total Score-flipped (delayed test)	8.04			
	Total Score-traditional (pretest)	3.41	225	-31.91	0
	Total Score-traditional (end-of module)	9.16			
	Total Score-traditional (end-of module)	9.16	225	8.857	0
Total Score-traditional (delayed test)	7.32				
Independent T-test	Total Score-flipped (pretest)	3.56	225	0.813	0.416
	Total Score-traditional (pretest)	3.41			
	Total Score-flipped (end-of module)	9.06	225	-0.365	0.715
	Total Score-traditional (end-of module)	9.16			
	Total Score-flipped (delayed test)	8.04	225	2.4	0.017
	Total Score-traditional (delayed test)				

Table 4. Paired and independent t-test comparison of overall mean scores of pre-test, end-of-module and delayed test according to instructional delivery

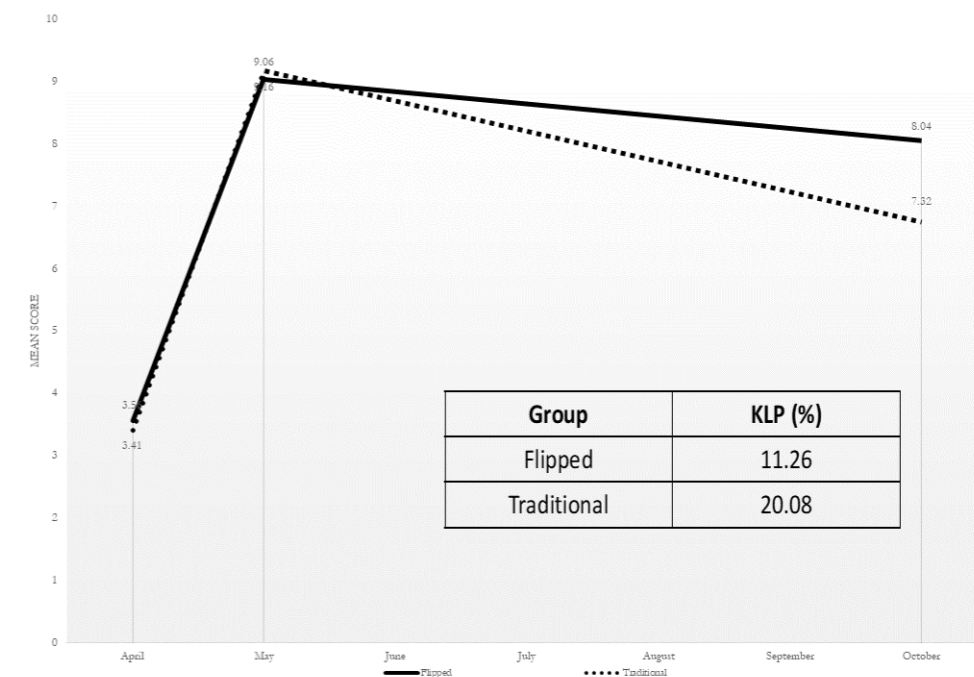


Figure 4. Overall mean scores of pre-test, end-of-module and delayed tests according to instructional delivery

scores of questions in which topics are delivered using the flipped classroom and traditional lecture strategy for pre-test, end-of-module, and final assessment testing points. For the pretest, the difference in scores for both flipped (M=3.56, SD=2.18) and traditional lecture (M=3.41, SD=1.86) was not statistically significant; $t(224)=0.813, p=0.416$. Similarly, a non-significant difference in scores for flipped (M=9.06, SD=2.98) and traditional lecture (M=9.16, SD=2.69) was also seen during the end-of-module test point; $t(224)=-0.365, p=0.715$. However, a statistically significant higher score was noted in the flipped classroom strategy group (M=8.04, SD=3.25) compared with the traditional lecture group (M=7.32, SD=3.11) during the delayed test, 5 months after the instructional delivery $t(224)=2.4, p=0.017$. Thus, scores before and after instruction are the same for both strategies, though both strategies manifested a decline during the

follow-up, traditional lecture shows a more pronounced decline versus the flipped classroom method.

Result Of Scores According To Delivery Of Instruction (Flipped Vs Traditional) And Question Level (Basic Knowledge And Clinical Correlation)

Comparison of scores according to question level (basic knowledge and clinical correlation) and delivery of instruction (flipped and traditional lecture) for the 3 test periods were analyzed using paired sample t-test (Table 5 and Figure 5), i.e. from pretest to end-of-module, and end-of-module to delayed test. For basic knowledge-flipped category, there was a significant increase in end-of-module score (M=5.57, SD=1.69) from the baseline pretest (M=2.03, SD=1.28) post-instruction $t(224)=-28.587, p=0.000$. Towards the delayed test, a significant decline in score from the end-of-module (M=5.57, SD=1.69)

	Pairs	Mean Score	N	t	Sig
Paired T-test	Basic knowledge-flipped (pretest)	2.03	225	-28.587	0
	Basic knowledge-flipped (end-of module)	5.58			
	Basic knowledge-flipped (end-of module)	5.58	225	7.142	0
	Basic knowledge-flipped (final assessment)	4.68			
	Clinical correlation-flipped (pretest)	1.53			
	Clinical correlation-flipped (end-of module)	3.48	225	-15.305	0
	Clinical correlation-flipped (end-of module)	3.48			
	Clinical correlation-flipped (final assessment)	3.37	225	0.738	0.461
	Basic knowledge-traditional (pretest)	1.36			
	Basic knowledge-traditional (end-of module)	4.85	225	-30.568	0
	Basic knowledge-traditional (end-of module)	4.85			
	Basic knowledge-traditional (delayed test)	3.27	225	12.199	0
	Clinical correlation-traditional (pretest)	2.05			
	Clinical correlation-traditional (end-of module)	4.3	225	-20.642	0
	Clinical correlation-traditional (end-of module)	4.3			
	Clinical correlation-traditional (delayed test)	4.3	225	2.097	0.037

Table 5a. Paired t-test comparison of total mean scores of pretest, end-of-module and delayed tests according to question level (basic knowledge vs clinical correlation) and instructional delivery (flipped vs traditional)

	Pairs	Mean Score	N	t	Sig
Independent T-test	Basic knowledge-flipped (pretest)	2.03	225	3.901	0.15
	Clinical correlation-flipped (pretest)	1.53			
	Basic knowledge-traditional (pretest)	1.36	225	-6.16	0.893
	Clinical correlation-traditional (pretest)	2.05			
	Basic knowledge-flipped (pretest)	2.03	225	5.818	0
	Basic knowledge-traditional (pretest)	1.36			
	Clinical correlation-flipped (pretest)	1.53	225	-4.142	0
	Clinical correlation-traditional (pretest)	2.05			
	Basic knowledge - flipped (pretest)	2.03	225	-0.152	0.88
	Clinical correlation - traditional (pretest)	2.05			
	Basic knowledge - traditional (pretest)	1.53	225	1.414	0.158
	Clinical correlation - flipped (pretest)	1.36			
	Basic knowledge-flipped (end-of module)	5.58	225	12.572	0
	Clinical correlation-flipped (end-of module)	3.48			
	Basic knowledge-traditional (end-of module)	4.85	225	3.797	0
	Clinical correlation-traditional (end-of module)	4.3			
	Basic knowledge-flipped (end-of module)	5.58	225	4.761	0
	Basic knowledge-traditional (end-of module)	4.85			
	Clinical correlation-flipped (end-of module)	3.48	225	-5.124	0
	Clinical correlation-traditional (end-of module)	4.3			
Basic knowledge - flipped (end of module)	5.58	225	8.335	0	
Clinical correlation-traditional (end-of module)	4.3				
Basic knowledge - traditional (end-of module)	3.48	225	-8.603	0	
Clinical correlation - flipped (end-of module)	4.85				
Basic knowledge-flipped (delayed test)	4.67	225	7.392	0	
Clinical correlation-flipped (delayed test)	3.37				
Basic knowledge-traditional (delayed test)	3.27	225	-4.684	0	
Clinical correlation-traditional (delayed test)	4.05				

Table 5b. Independent t-test comparison of total mean scores of pretest, end-of-module and delayed tests according to question level (basic knowledge vs clinical correlation) and instructional delivery (flipped vs traditional)

	Pairs	Mean Score	N	t	Sig
Independent T-test	Basic knowledge-flipped (delayed test)	4.67	225	7.852	0
	Basic knowledge-traditional (delayed test)	3.27			
	Clinical correlation-flipped (delayed test)	3.37	225	-4.137	0
	Clinical correlation-traditional (delayed test)	4.05			
	Basic knowledge – flipped (delayed test)	4.67	225	3.665	0
	Clinical correlation - traditional (delayed test)	4.05			
	Basic knowledge – traditional (delayed test)	3.37	225	0.608	0.544
	Clinical correlation – flipped (delayed test)	3.27			

Table 5b (continued). Independent t-test comparison of total mean scores of pretest, end-of-module and delayed tests according to question level (basic knowledge vs clinical correlation) and instructional delivery (flipped vs traditional)

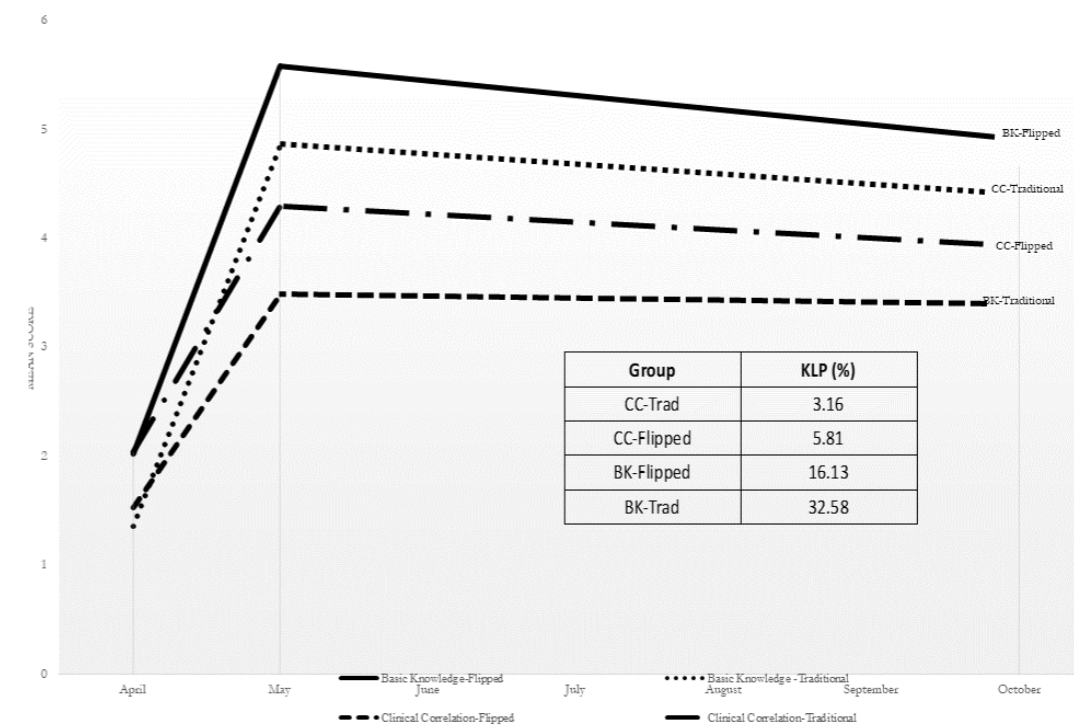


Figure 5. Comparison of total mean scores in pretest, end-of-module and delayed test according to instructional delivery and question level

to delayed test (M=4.68, SD=1.89) was observed; $t(224)=7.142, p=0.000$. Likewise, basic knowledge-traditional category has the same pattern with the former in which a significant increase was noted between the pretest (M=1.36, SD=1.16) and end-of-module (M=4.85, SD=1.53); $t(224)=-30.568, p=0.000$, and a significant decrease in score was observed between end-of-module (M=4.85, SD=1.53) and delayed test (M=3.27, SD=1.90); $t(224)=12.199, p=0.000$. For the clinical correlation-traditional lecture category, a significant difference in the mean scores between pretest (M=2.05, SD=1.21) and end-of-module (M=4.30, SD=1.55) was noted; $t(224)=-20.642, p=0.000$. However, there was a non-significant difference on the mean scores of end-of-module (M=4.30, SD=1.55) and delayed test (M=4.05, SD=1.66) of the clinical correlation-traditional lecture

category; $t(224)=2.097, p=0.037$. This is also the same pattern exhibited by the clinical correlation-flipped category, in which a significant increase in mean score from pretest (M=1.53, SD=1.42) to end of module (M=3.48, SD=1.84); $t(224)=-15.305, p=0.000$, and a non-significant difference between end-of-module (M=3.48, SD=1.84) and delayed test score (M=3.37, SD=1.83); $t(224)=0.738, p=0.461$. Independent samples t-test (Table 5 and Figure 5) was used to compare the mean scores of the three test points based on the 4 combined 2-factor categories (i.e. question level and instructional delivery). Comparison of mean scores in the pretest between basic knowledge-flipped (M=2.03, SD=1.28) and basic knowledge-traditional (M=1.36, SD=1.16) show a significant difference $t(224)=5.818, p=0.000$. Likewise, there was a significant difference in mean

score of clinical correlation- flipped (M=1.53, SD=1.42) and clinical correlation-traditional (M=2.05, SD=1.21); $t(224)=-4.142$, $p=0.000$.

For the end-of-module scores comparison, significant difference was noted between basic knowledge-flipped (M=5.58, SD=1.69) category and basic knowledge-traditional (M=4.85, SD=1.53); $t(224)=4.761$, $p=0.000$. Similarly, clinical correlation-traditional (M=4.30, SD=1.55) and clinical correlation-flipped (M=3.48, SD=1.84) scores are significantly different $t(224)=-5.124$, $p=0.000$. Finally, the delayed test results of the four combination group was analyzed and the scores between basic knowledge-flipped (M=4.68, SD=1.89) and clinical correlation-traditional (M=4.05, SD=1.66); $t(224)=3.665$, $p=0.000$, between clinical correlation-traditional (M=4.05, SD=1.66) and clinical correlation-flipped (M=3.37, SD=1.83); $t(224)=-4.137$, $p=0.000$, all show a significant difference. However, delayed test scores between clinical correlation-flipped (M=3.37, SD=1.83) and basic knowledge-traditional (M=3.27, SD=1.9) resulted in non-significant difference; $t(224)=0.608$, $p=0.544$. In terms of mean ranking, the highest scoring category are those from basic knowledge-traditional.

DISCUSSION

Overall Score

In this study, knowledge retention and decay were investigated among second-year students by retesting them using the same test items given during the diagnostic pretest and summative (end-of-module) assessment. The result showed that there was a low baseline knowledge among the participants during the diagnostic assessment (Figure 2 and Table 2). In turn, the scores significantly increase when tested after going through an

instructional module. After taking the test-retest 5 months after the administration of the summative assessment, a significant knowledge loss (KLP=15.65%) in the overall score was observed within 5 months of RI. By looking at the trend, there is approximately 3.13% knowledge loss occurrence per month. If knowledge loss continuously declines in one year, this is going to be equivalent to 37.56%. This finding confirms the result of the meta-analysis study of Custers, which states that a two-third to three-fourth retention after one year [1]. If RI is uninterrupted (no intervention), it is estimated that around 2-3 years, none of the acquired knowledge at the end of instruction can be remembered. However, this estimation may not be entirely correct. Harry Bahrick, from his several naturalistic studies on retention, was able to observe a triphasic behavior of knowledge retention. The first phase (first 6 years) presents an exponential decline from the acquired knowledge gained after instruction. The second phase (6-30 years) also called "*permastore*," a phenomenon in which there was an observed permanent retrieval of acquired knowledge. A possible reason is that during the initial storage of knowledge, there was a repeated relearning or rehearsal that happened during banking. The factor on repeated learning or rehearsal before administration of the summative assessment was not included in the design of this study; hence, this is a promising area of future research. Repeated learning is a common practice among medical students such that they tend to study in multiple frequencies for high stake examinations since these assessments are graded and reflected in their overall academic performance. The last phase is a period of knowledge loss, which is due to the natural course of aging [7].

The low baseline score can be attributed to the fact that most of the

participants have retained knowledge which they earned from their undergraduate or pre-medicine science courses, or probably, some students have managed to do an early pre-reading on the topics; thus, the score is not an absolute zero. Also, the possibility of guessing the correct answer for multiple-choice items can be a factor for the low pretest scores. As observed, overall scores increase after the instructional exposure, regardless of the teaching-learning method used. The increase in the score of the summative assessment can be attributed to the fact that the exam is a scheduled one (incorporated in the academic schedule) such that the students have allotted time and effort to study and prepare for this examination, and the exam score makes a significant component of the student's academic performance or grade.

Knowledge retention is determined by two factors. First, the amount of knowledge at the end of exposure and second, the length of retention interval (RI)[1]. The amount of knowledge post-exposure is directly proportional to the level of retention, while the length of RI is inversely proportional to retention [1]. Rehearsal and reinforcement during the period of RI delay the downhill trend of knowledge decay, which can be done by revisiting the learned materials. Obviously, the students who participated in the study may not have revisited the module or probably re-exposed themselves to the same material. In the first 2 months of the RI, this coincides with the academic break, and most of the students spend their time with the family or vacation, to unload the stress that they experienced during the whole academic year. It is an assumption that almost everyone during this period has never opened any of their books. During the next 3 months of RI, as they venture to the new academic curriculum, they are much focused on the new material rather than revisiting the concepts learned when

they were in the first year. Another possible reason is probably due to how the curriculum was designed in the second level. Such that, none of the neurology topics or instructions has been part of the first few modules in the first quarter of the academic year. The neurology module is taken up towards the last quarter of the academic year; hence, the possibility of a continuous decline in the overall score can be even higher beyond 5 months.

Instructional Delivery

In this study, the choice of instructional method was also considered. One arm of this study utilizes the flipped-classroom method, while the other arm uses the traditional lecture method. The findings show that both methods of instructional delivery offer an equal opportunity for the students to acquire knowledge, regardless of the content (Fig 4 and Table 4). Apparently, a decline in acquired knowledge can be observed for both, but the impact is more significant in the traditional lecture method (KLP=20.08% for traditional and 11.26% for the flipped classroom) upon administration of the delayed exam. This result supported the findings of Winter et al. In his study on a block lecture format, an increase in test scores was noted from pretest to post-test, and no improvement in knowledge was observed between the post-test and the delayed long-term exam. He attributes the increase in test scores as "booster effect" of the lecture-format instruction — however, this booster effect wears-off during the retention interval [8].

A possible reason for a slow decline in knowledge among questions in which topics are delivered in a flipped classroom method is the fact that longer time was allotted by the student in learning the material, hence augmenting rehearsal and reinforcement. In the flipped classroom, the factual material was made available for

everyone 2 weeks before the scheduled face-to-face session. The availability of the material allows the student to access it several times, thus enhancing repetition. Another possible reason is that the flipped classroom method fits well with the individual's learning style especially during the first phase, meaning a student can study at their own pace, at their convenient time and during the time they are highly motivated to learn the material. Lastly, since the basic factual knowledge was given ahead of time, the face-to-face session now only focused on the clinical correlation material, which has better retention than its counterpart. In the traditional method, the gargantuan amount of both the basic factual knowledge and clinical correlation are simultaneously delivered in the actual session which could probably lead to a cognitive overload of information, which prevents the storage of information in the short-term memory bank.

Question Level

The study also investigated knowledge retention if the content asked in question is a basic knowledge question versus clinical correlation (Figure 3 and Table 3). Half of the written questions of the tool asks for basic concepts, and the other half focus on clinical correlation concepts. The result of the study showed a non-significant difference for both question-level as far as diagnostic assessment is concerned. The factors of early pre-reading, knowledge acquisition during the undergraduate course, and "guessing chance" are the possible reasons for a low scoring for both the basic knowledge and clinical correlation. However, post-instruction exposure, basic knowledge was significantly higher as compared with clinical correlation.

As described by Klement et al., clinical correlation are tools that aid students in associating basic science concepts with

medical applications, and its use can be translated to improved grades and retention [10]. The finding of Klement compliments the result of this study in the sense that clinical correlation retention is better than basic knowledge. It is based on the decreasing trend on the scores of basic knowledge as compared with clinical correlation items. Though the basic knowledge score is higher compared with clinical correlation scores, it can be observed that the more downhill slope and a high KLP (23.97%) of the basic knowledge signify more loss as compared with clinical correlation.

Basic knowledge items scored higher than the clinical correlation for both summative and delayed test simply because the material, i.e., neuroanatomy, is mainly rich in basic concepts. Another explanation to this is that first-year medical students have a poor grasp of clinical correlation because their concept of the whole clinical picture is still low. However, the greater knowledge decline with the basic knowledge group can be attributed to the fact that students in the 2nd level are overwhelmed with the new advanced basic concept (in Pathology, Microbiology, and Pharmacology); hence, they are gradually forgotten. Also, none in the instructional materials and assessment tools (within the RI period) in the 2nd level covers the neuroanatomy topics. This decline in knowledge probably translates to "idleness" rather than going into the process of decay (knowledge lost forever). The state of idleness maintains the recognizability of the stored material. Meaning, the possibility that the student recognizing the learned concept once re-exposed to the same concept, thus reinforcing retention.

In the study of Klement et al., on the effectiveness of clinical correlation in the retention of knowledge, they associate the usage of cases or clinical scenarios allowing students to put different pieces of

knowledge together in a real-life perspective. In the information processing theory, this association cement the learned knowledge in short-term memory, thereby improving retention. Though clinical correlation items were scoring low as compared with the basic concepts, the retention is long-term. The possible reason for this is that clinical correlation items linked to its relevance to clinical practice or any disease entity giving much sense to a student, thus, firmly encoded in the memory bank [9].

In studying the retention property of the combined factors, clinical correlation demonstrates the most substantial ability to retain knowledge (KLP of CC-MCQ = 3.53% and CC-SA=6.40%), while basic knowledge exhibits the highest knowledge loss (KLP of BK-MCQ = 19.89 and BK-SA = 28.4%). The result translates to effective retention among clinical correlation concepts more than the basic knowledge. The idea of associating basic concepts with relevance to future use makes the items sustainable. Nonetheless, the two subgroups demonstrate the good combining factors in terms of knowledge retention as there was no significant change in the result between the summative assessment post instruction and the delayed testing.

Instructional Delivery and Question Level

In the pairing of question-level and instructional delivery (Figure 5 and Table 5), the diagnostic test point is mainly influenced by the question level since no instructional exposure that happened yet at this particular point. Though the result can be found erratic, but the variable score differences between basic knowledge and clinical correlation can be explained that the overall score comparison of the two factors, when considered solely, is non-significant. Post-instructional exposure, basic knowledge evidently peaks better as compared to clinical correlation. It also

shows the affinity of basic knowledge with flipped classroom mode of instruction and clinical correlation with traditional method of teaching.

The affinity of basic knowledge with a flipped classroom can be explained by the fact that basic concepts require time for better comprehension. The time is needed for the student to impose repetition, reinforcement, and practice on the learned material. The flipped classroom method also recognizes learners' individuality, allowing better knowledge retention as students learned at their own pace, own time, and at the point where they are highly motivated. Students have the opportunity of repeating and reinforcing as they have the time to learn the material. This is, in contrast, not offered in the traditional lecture in which the basic concepts are learned in a limited time. Meanwhile, the affinity of clinical correlation with the traditional method can be the result of the immediate association or pairing of basic concepts and clinical relevance. In the flipped classroom, the pairing is somewhat delayed because clinical correlation was introduced during the face-to-face session (as part of the design of this research), which is on the later part of the teaching strategy. The speed of knowledge loss is faster among basic knowledge concept, thus during the period of the learning interval (the period between independent learning and face-to-face session), the possibility that some of the basic learned knowledge might be easily forgotten thus the pairing is not that effective.

On the delayed testing result, clinical correlation concepts lead the rank (KPL for CC-T = 3.16% and CC-F = 5.81) translated to have better retention as compared to basic knowledge (KPL for BK-F = 16.13 and BK-T = 32.58). The result is also consistent with the initial finding on affinity with the corresponding teaching-learning strategy that the clinical correlation has a

better retention capability if taught in a flipped classroom. Likewise, teaching traditionally delays basic knowledge loss.

CONCLUSION AND RECOMMENDATIONS

In this study, a significant knowledge gain was observed after being exposed to the instruction medium, whether it is done using a flipped classroom or traditional lecture using the compared mean score of pre-test and end-of-module test ($p < 0.001$). A significant advantage of MCQ format over the short answer questions was observed during the pre-test ($p < 0.001$). In terms of question level, a rise of basic knowledge mean score was noted as compared with clinical correlation was observed in the summative end-of-module assessment ($p < 0.001$). The difference in instructional delivery was noted to be non-significant during the end-of-module test ($p > 0.05$). In the combined factors analysis, basic knowledge demonstrates a better knowledge gain when taught in a flipped classroom style, whereas clinical correlation result favors the traditional method ($p < 0.001$).

Using the KLP computation, the retention capability of the variables was determined. The study showed a 15.65% overall loss of gained knowledge 5 months after instructional exposure. The flipped classroom method offered higher retention (KLP= 11.26%) as compared with the traditional lecture (KLP=20.08%). Basic knowledge concepts have shown a more significant loss (KLP=23.97%), while clinical correlation demonstrates strong knowledge retention with a KLP = 4.50%. Combining factors showed a reliable retention power when clinical correlation concepts are coupled with traditional methods. Furthermore, basic knowledge (though manifest a steady decline), is best taught in a flipped classroom. Altering the combination decreases the retention power

of both basic knowledge and clinical correlation, respectively.

Significant knowledge loss, whether basic or clinical occurs after knowledge is gained post-instruction. However, greater knowledge loss is more pronounced among basic concepts. Likewise, clinical correlation has the highest retention capacity. Moreover, there are strategies identified that can lessen the impact of loss during the period of retention interval. When combined, clinical correlates, coupled with traditional lecture teaching strategy has the most significant retention capability. Equally, basic knowledge taught in the flipped classroom method offered significant retention.

To reduce the effect of knowledge loss, this study recommends that appropriate matching of knowledge level with strategies be employed to decrease the impact of knowledge loss of concepts taught. Instructional strategies and planning must be laid out carefully such that the chosen instruction should have a favorable outcome in terms of knowledge gain, and later on, knowledge retention. It is also recommended that health educational institutions offering Anatomy course should follow the preferred template of teaching the subject matter to ensure a longer retention of the learned concepts. A follow-up study on the behavior of retention and loss must be investigated after re-exposure to the same but advance concepts and while students are already in the actual workplace. Furthermore, this study can serve as prototype framework to study knowledge retention and loss among all basic science courses. Other areas for research that can be explored are the student factors that might affect knowledge retention, such as levels of motivation, learning styles, learners' characteristics in conjunction with the factors employed in this study.

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Perceived Barriers to Sexual Health Assessment Among Selected Young Adults at De La Salle Medical and Health Sciences Institute

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Abstract

Objective: To determine the perceived barriers to sexual health assessment among selected young adults at DLSMHSI.

Study Designs: Quantitative analytic

Setting: De La Salle Medical and Health Sciences Institute

Participants: A sample size of 357 from a total of 3,293 enrolled undergraduate students across colleges for the 2nd Semester of AY 2020-2021 was the target population of the study.

Methods: A self-made questionnaire anchored on Triadic Reciprocal Causation was administered to respondents.

Results: Of the 311 respondents, 183 (58.84%) met the criteria, mostly 18-21 years old, female, Catholic, from the Bachelor of Science in Nursing (BSN), and on their 3rd year. Both personal (mean = 3.67, standard deviation [SD] = 0.567) and environmental (mean = 3.42, SD = 0.411) factors were equally important barriers to the sexual health assessment behavior. However, one construct stood out as a highly important barrier - *if the examiner is of the same sex* (highest mean = 4.23, SD = 1.070) - under personal factor. Other barriers interpreted as “important” with the highest mean were *sexual health as an important issue* (mean = 4.14, SD = .995) and *familiarity with sexual health* (mean 4.01, SD = .949) under personal and academic factors, respectively. The lowest means and perceived as an unimportant barrier were *social stigma* (mean = 2.13, SD = 1.045), *cultural* (mean = 2.32, SD = 1.113), and *religious reasons* (mean = 2.37, SD = 1.060), all under value-related barriers. The computed t-values and f-values for sex (t=1.028; p=0.305), age (t=0.829; p=0.408), religion (t=1.320; p=0.189), undergraduate program (f=0.927; p=0.503) and year level (f=0.687; p=0.602) are not significant at the 0.05 level of significance.

Conclusion/Recommendations: Regardless of sex, age, religion, undergraduate program, and year level, the perceived barriers to sexual health assessment are similar. The barrier that likely influences the young adult to undergo sexual health assessment is the sex of the examiner, while the least concerns were social stigma, religious and cultural reasons. Provision of separate rooms, having same sex examiner and conducting short sessions on sexual health assessment may influence submission to sexual health assessment.

I. INTRODUCTION

A. Introduction

One of the essential and vital aspects of human health is sexual health as it helps individuals take care for their well-being and their intimate relationships^[1]. World Health Organization^[2] describes sexual health as:

...a state of physical, emotional, mental, and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction, or infirmity. Sexual health requires a positive and respectful approach to sexuality and sexual relationships, as well as the possibility of having pleasurable and safe sexual experiences, free of coercion, discrimination, and violence. For sexual health to be attained and maintained, the sexual rights of all persons must be respected, protected, and fulfilled. (para. 4)

Thus, sexual health assessment is an important aspect of patient care. Sexual health assessment is a health assessment that focuses on the sexual health of an individual. However, sexual health assessment is often neglected because some patients are not comfortable talking about this. Failure to assess sexual health leads to missed opportunities in distinguishing sexual health problems, e.g. sexually transmitted infections (STI), cancer and human immunodeficiency virus (HIV).^[3]

Several studies show that barriers are experienced when it comes to sexual health assessment.^[1] A barrier is something that stops an event or incident from happening or a thing that makes it harder for something to occur.^[4] Therefore, barriers to sexual health assessment are factors to difficulty performing it. In a literature review, it is said that barriers affecting sexual health assessment are multifactorial.^[1] That is why they grouped the barriers into four

categories: (1) nurses-related, (2) organizational and academic-related, (3) patient-related, and (4) values-related barriers.^[1] In another study, they were classified into three categories, namely, (1) psychosocial accessibility, (2) cognitive accessibility, and (3) geographical accessibility.^[5] Barriers to sexual health assessment are present and there are different aspects that can affect it. Perceiving barriers to sexual health assessment may differ in terms of sex, age, religion, undergraduate program, and year level. For instance, the results of the study conducted by Newton-Levinson^[6], the stigma and provider's attributes such as gender difference, age gap, skills were observable among women than men. Moreover, in the study by Godia et al.^[7], they concluded that young people's perception towards sexual health assessment or services varies depending on age. Whereas, in the study by Hobern^[8], the perceived barriers to sexual health assessment can be encountered and experienced similarly by the students regardless of religion. Furthermore, Cassidy et al.^[9] found out that university students have identified and experienced barriers to accessing sexual health services. Lastly, they concluded that those students that belong to a higher year level tend to use sexual health services on campus which may mean that barriers are less experienced in higher year levels.

Young adults around their twenties are at increased risk of developing STDs due to the combination of culture, characteristics and biological factors.^[10] This age group is composed of 25% of people who are sexually active and vulnerable to HIV infection, STDs and other forms of cancer, such as breast cancer, prostate cancer, etc. Davidson^[11] stated that certain STDs can increase the risk of developing cancers. Most common types of cancer in young adults (ages 20-39) include breast,

colorectal, cervical and ovarian cancer, though they stated that these cancers are more common among ages 25 and above.^[12] Moreover, about 50% of testicular cancer cases happen in men ages 20-34.^[12] These diseases can possibly develop if left untreated and sexual health is neglected.

Although based on the literatures, chances of young adults having cancer are not that high. However, healthcare professionals should not neglect these possibilities. That is why, the researchers would like to know the perceived barriers in sexual health assessment among selected young adults at De La Salle Medical and Health Sciences Institute (DLSMHSI).

Furthermore, the researchers decided to investigate this topic because during enrolment they observed that this part of annual medical checkup of the institution is usually skipped even though students are provided free access to it. Usually, a waiver about it is provided or students are asked if they wanted to have a sexual health assessment or not. Moreover, conducting this study can make the institution and students do appropriate intervention to address these perceived barriers for the betterment of the health of the students since sexual health is an important aspect of patient care. Further problems can arise if this aspect will be missed. Another reason as to the conduct of this study is that there are few studies done locally about this topic particularly to the target population which are young adults.

B. Review of Related Literature

In general, sexual health is an important component of personal well-being. It is a state of well-being that includes physical, physiological, mental, social, and spiritual aspects in relation to sexuality in life. Sexual health, if perceived in the affirmative, includes a constructive and sincere mentality to sexuality and relations, as well as the sexual probability encounters that are pleasing and healthy, free from

abuse, prejudice, and aggression.^[2] A very important part of assessing the reproductive system of a female is a direct and complete sexual health assessment.^[13] Health assessment is "a systematic method of collecting data about a patient for the purpose of determining the patient's current and ongoing health status, predicting risks to health, and identifying health-promoting activities".^[14] Some physical examinations for women include vaginal, cervical and perianal skin while testicular and perianal skin examinations are for male.^[15]

When sexual health is not assessed, opportunities to differentiate sexual health concerns such as sexually transmitted infections (STIs), cancer, and human immunodeficiency virus (HIV) are overlooked.^[3] Young adults are at a period of sexual risk-taking and experimentation; therefore, they are more vulnerable to sexual illnesses. It was reported that every year, half of the young adults aged 15-24 about 20 million are newly diagnosed with STDs.^[10] Philippines was among the countries worldwide with a high incidence-prevalence ratio of HIV.^[16] Moreover, cervical cancer is the second most common disease affecting women and the second leading cancer site in the Philippines because every woman who already have had sexual intercourse is already vulnerable.^[17] Other cancers such as thyroid and testicular cancer most often develop at a young age. Prostate cancer is the fourth leading cancer site for Filipino males with nearly eight new cases per day.^[18] The prevalence of these diseases may be on the rise since young adults mostly ignore assessing their own sexual health, but the number of occurrences prompts everyone to become aware of their sexual health.

There are some journals and literature reviews about barriers to sexual health assessment. A study was conducted to know the anticipated problems in

accessing sexual health care among undergraduate students.^[9] It found out that university students have a high chance of getting STIs and other health problems.^[9] Sexual health services (sexual health promotion, etc.) are available at university health centers; however, a lot of students suspend or just simply do not seek care.^[9] Researchers were able to classify 10 barriers and enablers to sexual health: (1) lack of sexual knowledge and awareness in terms of sexual health; (2) not enough knowledge about their sexual health and services that they can avail for lesbian, gay, bisexual, transgender, and queer students; (3) sexual health services are not easily seen by the students; (4) establishing trust between health care provider and students; (5) influence of peers; (6) culture in the campus; (7) convenience when accessing the services; (8) period of adventure and getting to know new things; (9) normalizing sexual health; (10) the stigma about this topic and the issue of privacy and confidentiality.^[9] These actors were identified using a theory-based approach.^[9] The following barriers are encountered in individual, interpersonal and health service levels.^[9]

In two similar studies^[5]^[9], it was found out that the main barriers which stop the youth aged 15-25 from seeking and maximizing the services for sexual and reproductive health are linked to two main categories that are cognitive and psychosocial, accessibility and an additional category which is geographical accessibility which is about youth-friendly health clinics not having enough time for consultation or availability.^[5] It was concluded that a multi-component strategy is required in order to provide better services, like having clinics which are youth friendly, introducing sexual education in schools, having a referral system between schools and youth-friendly clinics, and lastly, having support from the community.^[5]

A study was conducted about the perceived barriers experienced in maximizing the use and access of adolescent health services in Ghana. [19] The data that were gathered in their study are grouped into four: (1) facility-level barriers which discuss the problems that are related to facilities such as the lack of enough space and privacy, and insufficient medicine and supplies; (2) provider-related barriers such as being disrespectful, discriminatory, and judgmental attitudes; (3) community-level barriers such as having parents who are not supportive, the negative stigma and also the influence of the peers; (4) personal-level barriers which tackles about fear, not having sufficient knowledge about this matter, and financial constraints. [19] The authors believed that the results of this study may benefit health authorities and workers, especially those who focus on the health of adolescents. [19]

A literature review shows that in a clinical setting, sexual health is mostly disregarded. [1] Barriers encountered to attend sexual health are multifactorial and classified into four categories: (1) nurses-related, (2) patient-related, (3) organizational and academic-related and, (4) values-related barriers. [1] Nurses-related barriers are related to nurses' insufficiency of training and knowledge about sexual health, for instance, an excessive workload which can result in not having enough time to address patient's health, etc. Patient-related barriers have to do with personal reasons which, for some patients, sexuality is not a big deal, severity of the illness of the patient does not allow himself/herself to have a sexual health assessment, there is another person present while staying in the hospital, etc. Organizational-related barriers pertain to problems with health care and academic institutions such as not having enough rooms that provide privacy for sexual health assessment and not having a section for sexual health assessment in the

nursing assessment sheet, etc. Values-related barriers are basically related to personal principles of the person such as reasons related to culture, religion, language or ethnicity, social stigma about sexual topics which result in restriction of discussion about this topic, etc. [1] The study concluded that nurses experience a lot of sexual health assessment barriers. [1] It recommended to develop suitable interventions and to conduct further studies about the barriers. [1]

Lastly, a study was conducted about the perceived and experienced barriers of adolescents to accessing STI care services in low- and middle-income countries. [6] It was determined that youth lack knowledge about STIs and services intended for these and that they prefer to have a provider of the same sex when accessing sexual and reproductive health services. [6] It was also identified that the common barriers experienced were related to acceptability of services, confidentiality concerns, and characteristics and behavior of the provider. [6] It was concluded that avoidance of seeking care and services was due to shame and stigma experienced by the youth. [6]

C. Significance of the Study

The outcome of this study will be advantageous to the following individuals and institutions:

Young adults. The findings of this study will be beneficial for them to understand the importance of sexual health assessment and be knowledgeable about the possible risk of undiagnosed diseases.

Nursing professionals. Knowing the result of this study, professionals can develop interventions through which sexual health assessment can be improved in order to know health problems as soon as possible, and modified interventions that can fully help in assessing the sexual health of a patient.

De La Salle Medical and Health Sciences Institute (DLSMHSI). The institution includes sexual health assessment in their annual medical checkup for students. The result of this study can help them improve the process in order to somehow encourage the students to undergo this assessment if they want to, for the purpose of health promotion and prevention of health problems.

Academic community. The results may be used to develop possible strategies that the researcher can share to students in order to improve the quality of sexual health assessment.

Future researchers. The outcome that can be obtained from this study can help future researchers to conduct studies about possible interventions that can be done to address the perceived barriers. This study will also serve as a future reference for other researchers who will conduct studies of a similar topic.

II. Objectives of the Study

A. General Objectives

This study aimed to determine the perceived barriers in sexual health

assessment among selected young adults in DLSMHSI.

B. Specific Objectives

It specifically determined the following:

1. Profile of the respondents in terms of age, sex, religion, undergraduate program, and year level.
2. Perceived barriers in sexual health assessment that occur among selected young adults.
3. Significant difference in the perceived barriers in sexual health assessment when grouped according to sex, age, religion, undergraduate program, and year level.

III. Patients and Methods

A. Study Design and Theoretical/ Conceptual Framework

The researchers used a quantitative analytic research design which is a method that uses mathematical and statistical modeling, calculation, and research to explain behavior [20]. It aims to test the hypothesis and to measure the relationship or interaction between two variables: exposure and outcomes. [21] The quantitative analytic research design was used together

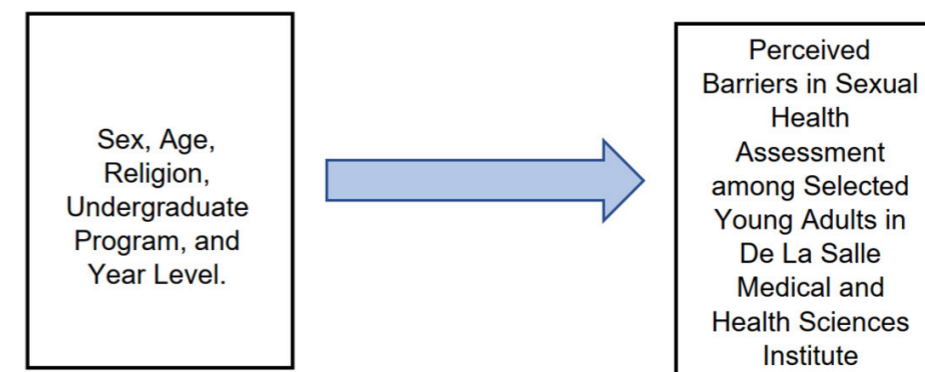


Fig. 1 Perceived barriers in sexual health assessment among selected young adults in DLSMHSI

with t-test and ANOVA to measure the significant difference in the perceived barriers in sexual health assessments among selected young adults in DLSMHSI when grouped in terms of sex, age, religion, undergraduate program, and year level (See Figure 1).

A self-made questionnaire anchored on Triadic Reciprocal Causation was administered to respondents. This scheme presumes that the action performed by an individual is a product of interaction among the environment, behavior, and person or personal factors. A person is represented by their gender, social position, size, and physical attractiveness, but most especially, by their cognitive factors such as thought, memory, judgment, foresight among others.^[22] Environment refers to both physical and social environment which also include values and notions. Behavior refers to actions as influenced by personal and

environment factors.^[23] In this study, all student-related factors reflect the personal factor, while the nurse, academic and value related factors reflect the environment factor. Having or not having sexual health assessment reflects a particular behavior (See Figure 2).

B. Study Setting

This study was conducted at De La Salle Medical and Health Sciences Institute.

C. Study Population

Enrolled undergraduate students across colleges for 2nd Semester Academic Year 2020-2021 served as the population of the study. The total population for undergraduates in the locale under investigation was 3,293. Using the Slovin’s formula, the researchers were able to compute for the sample size of 357. However, 311 signified willingness but only 183 met the criteria. Then, the student researchers determined the sample size of

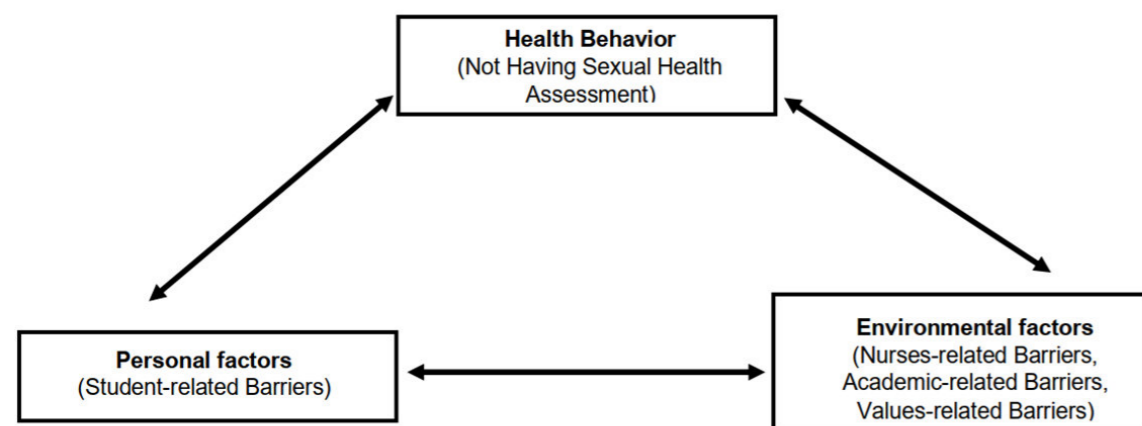


Fig. 2 Perceived Barriers in Sexual Health Assessment among Selected Young Adults in DLSMHSI Based on the Triadic Reciprocal Causation of Albert Bandura

each subgroup of undergraduate programs using ratio and proportion.

The inclusion criteria were: (a) aged 18-25 years old; (b) were asked to have a sexual health assessment; (c) enrolled in the second semester of the Academic Year 2020 – 2021 in any of the following undergraduate programs: (1) BS Biochemistry, (2) BS Biotechnology, (3) BS Medical Laboratory and Science, (4) BS Radiologic Technology, (5) BS Nuclear Medicine Technology, (6) BS Pharmacy, (7) BS Nursing, (8) BS Physical Therapy, (9) BS Occupational Therapy, (10) BS Speech and Language Pathology; (d) willing to participate in the study. There were no exclusion criteria used.

D. Methodology

1. Research Tool

The instrument was a self-made questionnaire containing questions derived from the results of two different studies by Thongmixay et al.^[5], and Abuosi and Anaba^[19] and also from a literature review by Bdair and Constantino^[1]. The environmental factor and personal factor in the Triadic Reciprocal Causation of Bandura were used as the two main categories of perceived barriers to sexual health assessment. In environmental factors, there are three sub-categories: nurses-related barriers, academic-related barriers, and values-related barriers. In the personal factor, there is only one sub-category which is the student-related barrier. The tool was divided into two parts: the first part collects demographic data and the second part is composed of 26 questions pertaining to perceived barriers in sexual health assessment.

A Likert scale was used to determine the perception of the respondents^[24] on barriers among^l the resin sexual health assessment, using the following scale: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree. The means were interpreted as follows: 1.0 – 1.8 as a

highly unimportant barrier, 1.81 – 2.60 as an *unimportant barrier*, 2.61 – 3.40 as a *neutral barrier*, 3.41 – 4.20 as an *important barrier*, and 4.21 to 5.0 as a *highly important barrier*.

2. Validation of the Instrument

The content of the tool underwent scrutiny and was revised a few times based on the comments and suggestions of the expert validators of the College of Nursing.

3. Ethical Considerations

This study was thoroughly reviewed by the College of Nursing committee on ethics and obtained a certification of Ethics Review, instead of Ethics Review control number.

4. Data Gathering

A. Data Gathering

Phase I: Social Preparation- After obtaining approval from the ethics and technical review panel for the data gathering procedure, student researchers first sent a letter to the deans of every College to seek permission to conduct the study. Upon approval, the researchers sent a letter to the student council presidents to ask for the contact information of their year-level representatives. Next, the student researchers sent a letter to every year level representative to ask for the contact information of the class president of each class and ask them if they could disseminate the message that includes the link to the questionnaire along with the instructions, inclusion criteria, and its explanation to their classmates. However, in the College of Rehabilitation Sciences, such a process was not allowed as per existing protocols; nevertheless, the researchers followed the instructions as to how they wanted them to proceed in conducting their study in their College.

Phase II: Actual Data Gathering- The student researchers contacted the presidents of each class and asked them if they could disseminate to their classmates the message that includes the questionnaire link along with the instructions and inclusion

criteria and its explanation. Upon approval, the link to the Google Forms was disseminated. In the form, the first thing the participants could see was the informed consent. If they agreed to participate in this study, as manifested in the informed consent, they could proceed with accomplishing the demographic part of the tool to know who would qualify as respondents for the study. If qualified, the next part was the questionnaire proper for the perceived barriers to sexual health assessment. Answering the questionnaire took 10-20 minutes of their free time. The researchers encouraged the respondents to contact them for questions and clarifications on the questionnaire. With a total of six follow-ups made through email, the researchers established a constant communication with the class presidents of each program to monitor the turnout of responses from the respondents. For BS Biotechnology, the researchers were not able to contact the year level representative of the respective program that is why the student researchers opted to ask the Student Council President of College of Humanities and Sciences to disseminate the questionnaires, instead. Moreover, in the College of Rehabilitation Sciences, their Help Desk was the one who gathered the data within their college in compliance with their protocol. They sent through email the message that includes the questionnaire link along with the instructions, inclusion criteria, and its explanation to the target respondents. (See Figure 3)

B. Data Confidentiality and Storage

The student researchers indicated in their informed consent that the collected data will only be read and used for the sole purpose of the study to ensure confidentiality and anonymity. Furthermore, the student researchers used Google Forms for the data collection as it has the ability to store data in a spreadsheet that could only be accessed by the researchers as it is

password-protected. A new Google account was created and used exclusively for data gathering. The collected data should only be kept for two years and would be discarded thereafter.

C. Data Recording

After gathering the data using the Google Forms, the data were recorded using Google Sheet that was created and accessed using the exclusive Google account for this study. Google sheet is the counterpart of Microsoft excel through which the data were encoded using codes set by the student researchers and the statistician. After that, the file was forwarded to the statistician for statistical analysis.

D. Statistical Tools

The following statistical treatment of data was used in order to answer the queries of the study: frequency and percentage distribution to identify the profile of the respondents in terms of age, sex, religion, undergraduate program, and year level; mean and standard deviation to analyze the perceived barriers in sexual health assessment; and, T-test and ANOVA to determine the significant difference in the perceived barriers to sexual health assessment.

Definition of Terms

The following terms is defined within the context of the study:

Age. The number of years that someone existed. In this study, it was used as one of the criteria in selecting the respondents, categorized as (1) 18-21 and (2) 22-25.

Perceived Barriers in Sexual Health Assessment (PBSHA). The perception of young adults about barriers to sexual health assessment in terms of environmental and personal factors. There were 26 questions answered through a Likert scale with the following options: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree. The means were interpreted as 1.0 – 1.8 as a highly unimportant barrier,

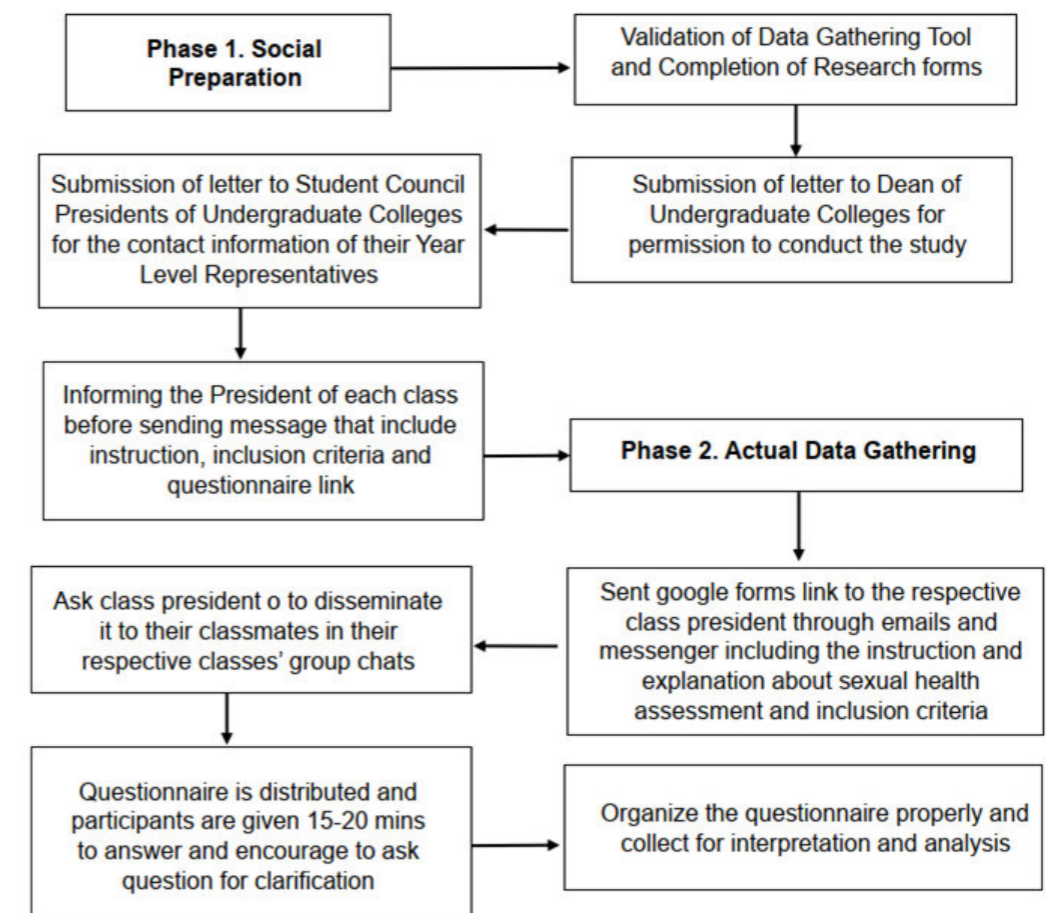


Fig. 3. Data gathering procedure

1.81 – 2.60 as an unimportant barrier, 2.61 – 3.40 as neutral, 3.41 – 4.20 as an important barrier, and 4.21 to 5.0 as a highly important barrier.

Environmental Factors. The attitudes, beliefs, ideas, and behavior of a person. In this study, it was categorized into (a) nurses-related barriers, (b) academic-related barriers, and (c) values-related barriers.

Personal Factors. The personality, characteristics, and cognitive abilities of the individual to think critically, to learn, and to comprehend. In this study, it refers to student-related barriers.

Religion. The spiritual belief of an individual. In this study, it was categorized

as (1) Roman Catholic and (2) Non-Roman Catholic.

Sex. The biological differences and aspects of a person. In this study, it was categorized as (1) male and (2) female.

Year Level. The year of study and learning areas of the respondents. In this study, it was categorized as (1) 1st- year level, (2) 2nd- year level, (3) 3rd- year level, (4) 4th year level, and lastly (5) 5th year level for College of Rehabilitation and Sciences which offers five-year courses.

Undergraduate programs. In this study, it was defined as programs offered by a college or institute from which the respondents originated. These programs are

(1) BS Biochemistry, (2) BS Biotechnology, (3) BS Medical Laboratory and Science, (4) BS Radiologic Technology, (5) BS Nuclear Medicine Technology, (6) BS Pharmacy, (7) BS Nursing, (8) BS Physical Therapy, (9) BS Occupational Therapy, and (10) BS Speech and Language Pathology.

Young adult. Walker-Harding et al. defines the age of 18-25 years old as young adulthood. [26] In this study, they served as the respondents of the study that met the inclusion criteria of this study.

E. Results and Data Analysis

A total of 311 respondents willingly participated in the study. However, 183 or 58.84% were able to proceed to the survey after having met the criteria set in this study. Among the respondents, (a) 168 or 91.80% were 18-21 years old while 15 or 8.20% were 22-25 years old; (b) 141 or 77% were female while 42 or 23% were male (figure 4); (c) 150 or 82% were Catholic (figure 6) while 33 or 18% were non-Catholic; (d) 5 or 2.7% were from BS Biochemistry (BCH), 1 or 0.5% from BS Biotechnology (BT), 41 or 22.4% in BS

Medical Laboratory and Science (MLS), 33 or 18% in BS Radiologic Technology (RT), 4 or 2.2% in BS Nuclear Medicine Technology (NMT), 20 or 10.9% in BS Pharmacy (BSP), 51 or 27.9% in BS Nursing (BSN), 11 or 6% in BS Physical Therapy (PT), 11 or 6% in BS Occupational Therapy (OT), and 6 or 3.3% in BS Speech and Language Pathology (SLP) (figure 5) ; (e) 51 or 28% were on their 1st-year level, 53 or 29% were on their 2nd-year level, 71 or 39% on their 3rd-year levels, 6 or 3% on their 4th-year level, while 2 or 1% on their 5th-year level (figure 6).

Environmental factors (mean =3.42 SD =0.411) and Personal factors, (mean= 3.67, standard deviation= .567) were both perceived by the respondents as important barriers. As to categories, the academic-related barriers under the Environmental Factors obtained the highest mean of 3.83 and a standard deviation of . 829, while student-related barriers, being the only category under the Personal Factors, had a mean of 3.67 and a standard deviation of

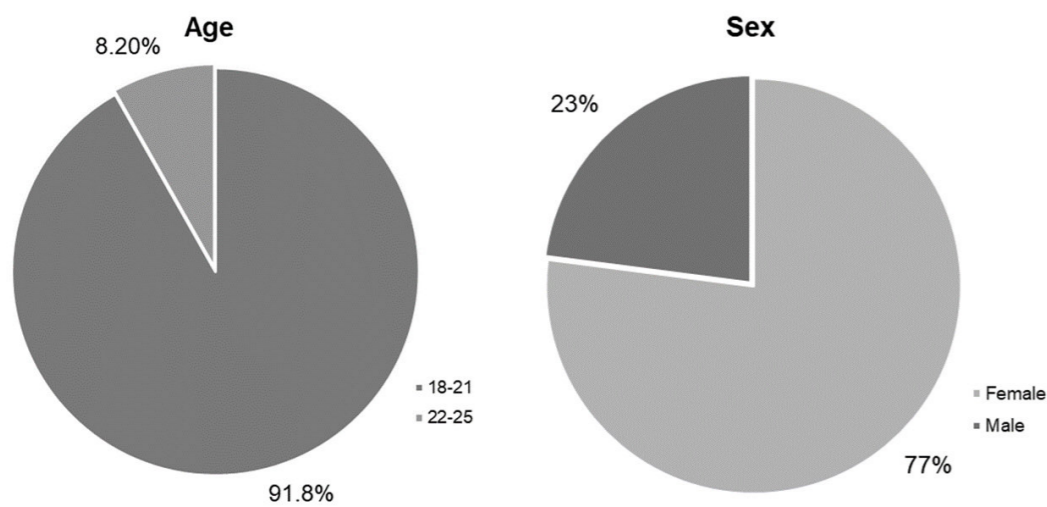


Fig 4. Profile of respondents in terms of age and sex

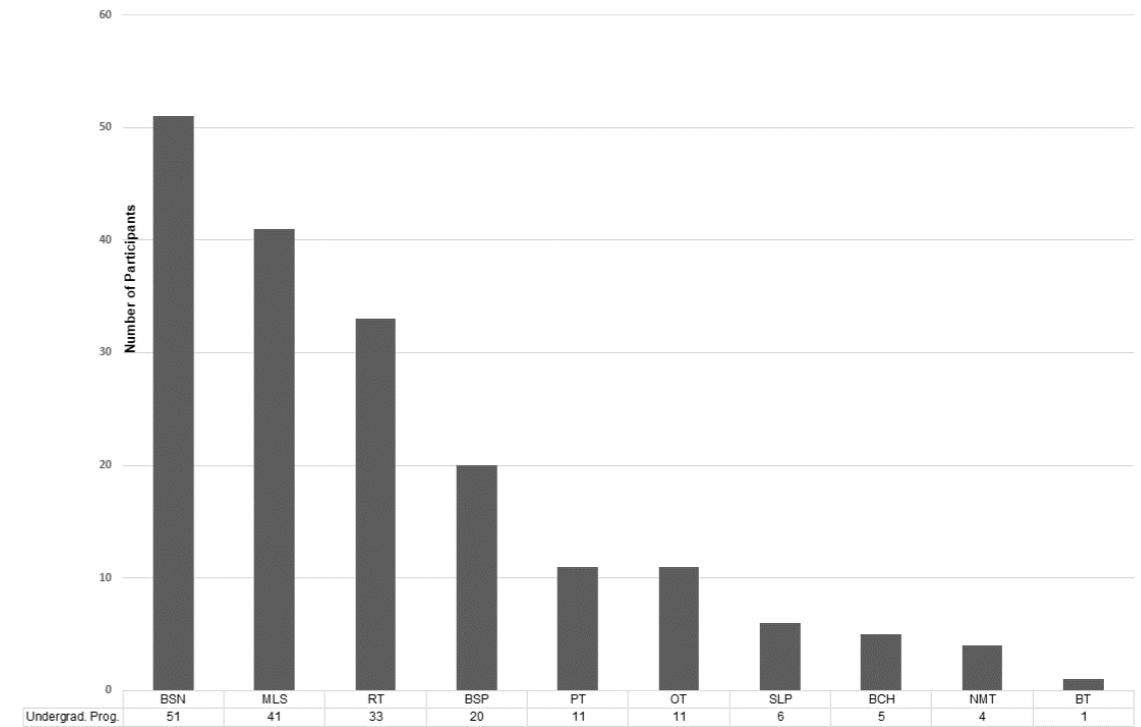


Fig. 5 Profile of respondents in terms of undergraduate program

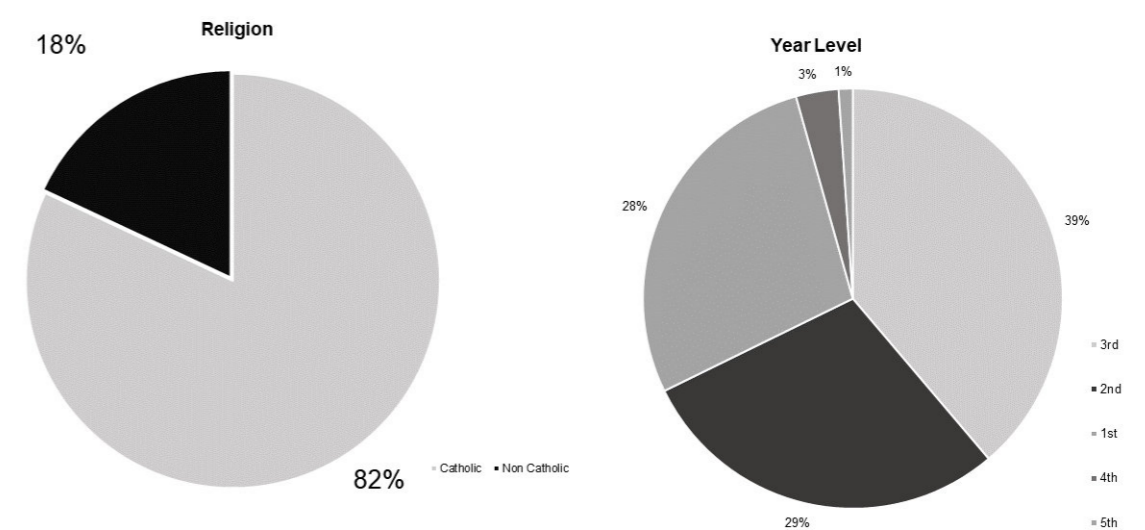


Fig. 6 Profile of respondents in terms of religion and year level

.567. Both of them were perceived by the respondents as *an important barrier*.

Among all the factors, *same sex examiner* has the highest mean of 4.23 with a standard deviation of 1.070 and viewed as a *highly important barrier* by the respondents. Those considered *important barriers* as they have the second and third highest mean were: (a) *Personally, sexual health is an important issue* (mean= 4.14, standard deviation= .995), and (b) *They are familiar with sexual health since this topic is already discussed to them and it is clear to them* (mean=4.01, standard deviation=0.949). Meanwhile, the following factors have the lowest mean and perceived by the respondents as an *unimportant barrier*, (a) *There is a social stigma about this topic* (mean= 2.13, standard deviation= 1.045), (b) *Some cultural reasons* (mean= 2.32, standard deviation= 1.113), and (c) *Some religious reasons* (mean= 2.37, standard deviation= 1.060). (See Table 1)

According to Triadic Reciprocal Causation, behavior is influenced by environment and personal factors. The result of the study clearly indicates that their being female or male brings a personal conviction that led to the choice of being examined by the same sex, and the value placed on sexual health as they understood the meaning of sexual health is chosen over stigma, cultural and religious reasons, thus, give rise to the submission to sexual health assessment. This shows that the knowledge acquired from their classes and perhaps from the social media brought understanding of sexual health. The computed t-values and f-values for sex (t=1.028; p=0.305), age (t=0.829; p=0.408), religion (t=1.320; p=0.189), undergraduate program (f=0.927; p=0.503) and year level (f=0.687; p=0.602) are not significant at the 0.05 level of significance.(See Tables 2 to 6).

The findings reveal that the perceived barriers to sexual health assessments are similar when grouped by

sex, age, religion, undergraduate program, and year level. The result is supported by another study showing that the lack of knowledge about sexual health assessment and the lack of service awareness are the most significant barriers to people’s access to sexual health services. [5]

These findings may suggest that if the institution handles sexual health very well in terms of policies and implementation (academic-related barriers) young adults can gain more knowledge, awareness, and achieve comfort (student-related barriers) about sexual health and sexual health assessment which can result in young adults subjecting themselves to sexual health assessment.

Consistent with two different studies, this study found that barriers to sexual health assessment include lack of privacy, lack of knowledge of the availability and the process of the assessment, lack of support, resources, and health policies from the institution, and feeling uncomfortable when discussing sexual health issues with a health care provider. [1, 27]

IV. Conclusion

The personal and environmental factors were perceived to be important barriers to sexual health assessment among the young adults regardless of their sex, age, religion, undergraduate program and year level. Furthermore, personal factor and the academic-related factors specifically on the sex of the examiner is highly important and sexual health education is important barrier in the conduct of sexual health assessment.

Limitations

Limitations were encountered during the process of data gathering even though a step-by-step process was carefully done by the researchers. First, the collection of data was purely done online. Only the respondents willing to join the study were given access to the online survey form

ENVIRONMENTAL FACTORS:	Mean	SD	Interpretation
A. Nurse-related Barriers			
1. I engage myself in sexual health assessment because the nurse does not seem to be in a hurry.	3.34	.912	Neutral
2. I engage myself in sexual health assessment because I feel that the nurse knows much about the procedure that needs to be done to me.	3.83	.925	Important Barrier
3. I engage myself in sexual health assessment because I am well informed by the nurse on how the procedure will be done to me.	3.84	.952	Important Barrier
4. I engage myself in sexual health assessment because I can feel that the nurse is comfortable in talking about this matter.	3.93	.970	Important Barrier
5. I engage myself in sexual health assessment because I can see that my health care provider is very welcoming.	3.90	.927	Important Barrier
6. I engage myself in sexual health assessment because I feel that the health care provider will not judge me.	3.84	1.012	Important Barrier
Mean	3.78	.787	Important Barrier
B. Academic-related Barriers			
1. I engage myself in sexual health assessment because I know that the institution where the assessment will happen does have enough privacy.	3.70	1.085	Important Barrier
2. I engage myself in sexual health assessment because I am familiar with sexual health since this topic was discussed and is already clear to us.	4.01	.949	Important Barrier
3. I engage myself in sexual health assessment because I know that these services are available.	3.78	.994	Important Barrier
4. I engage myself in sexual health assessment because there are no possibilities that the institution might disclose information about my sexual health.	3.81	1.041	Important Barrier
Mean	3.83	.829	Important Barrier
C. Values-related Barriers			
1. I am comfortable having a sexual health assessment despite of some cultural reasons.	2.32	1.113	Unimportant Barrier
2. I am having or engaging myself in a sexual health assessment despite of some religious reasons.	2.37	1.060	Unimportant Barrier
3. I am comfortable talking about sexual health topics with my health care professional even though there is a social stigma about this topic.	2.13	1.045	Unimportant Barrier
4. I do talk about sexual health or sexual health assessment even though sexuality is somehow a private matter to me.	2.39	1.073	Unimportant Barrier
5. I am comfortable talking or having a sexual health assessment even though the healthcare provider is way older than me.	2.48	1.109	Unimportant Barrier
6. I am comfortable talking or having a sexual health assessment even though there is a social interpretation that exploration of sexuality is just a means of pleasure and enjoyment.	2.52	1.128	Unimportant Barrier
7. I am having or engaging myself in a sexual health assessment because I am not afraid that my parents might know that I have had these procedures done to me, and that I talk about this matter and that they might judge me.	3.33	1.191	Neutral
8. I engage myself in sexual health assessment because my friends are also having one.	2.84	1.175	Neutral
9. I am comfortable having a sexual health assessment even though someone is in the room with me.	3.64	1.271	Important Barrier
Mean	2.67	.519	Neutral
OVER-ALL MEAN (ENVIRONMENTAL)	3.42	.411	Important Barrier
PERSONAL FACTORS:			
A. Student-related Barriers			
1. I engage myself in a sexual health assessment because personally, sexual health is an important issue for me.	4.14	.995	Important Barrier
2. I am comfortable having a sexual health assessment when the examiner/health care professional is of the same sex.	4.23	1.070	Highly Important Barrier
3. I do open a conversation with my healthcare provider regarding sexual health because I feel that even though I ask about this topic, he/she will understand me.	3.85	.969	Important Barrier
4. I am comfortable talking or having a sexual health assessment because I know how the examination, and such is done.	3.75	.990	Important Barrier
5. I engage myself in sexual health assessment because we can sustain it financially.	3.33	1.040	Neutral
6. I engage myself in sexual health assessment even though there is a possibility that someone I know might see me visiting the clinic for these services.	2.81	1.098	Neutral
7. I would like to engage myself in a sexual health assessment, but I prefer to discuss it to a very close friend who has knowledge on sexual health.	3.76	1.031	Important Barrier
OVER-ALL MEAN (PERSONAL)	3.67	.567	Important Barrier
OVER-ALL MEAN (PERCEIVED BARRIERS)	3.55	.431	Important Barrier

Table 1. Perceived barriers in sexual health assessment among selected young adults in DLSMHSI

containing the instructions and explanation of the inclusion criteria. Despite six follow-ups, a number of students were not able to answer the questionnaire signifying their lack of interest in the study. Second, instructions and explanations about the procedure were given online. Third, in the case of the College of Rehabilitation Sciences (CRS), only the CRS Help Desk was

able to communicate with their students as per guidelines, giving the researchers difficulty following up on their responses. Lastly, the lack of time to gather data was also seen as a limitation since the researchers also needed to meet the deadline set by the College for the manuscript before the final oral defense. The pandemic caused difficulty in gathering

Sex	Mean	SD	T- value	P-value	Interpretation
Female	3.56	.446	1.028	0.305	NS
Male	3.49	.372			

Legend: S.D.- Standard Deviation, NS- Not Significant at 0.05 Level of Significance

Table 2. Perceived barriers in sexual health assessment when grouped according to sex

Age	Mean	SD	T- value	P-value	Interpretation
18-21	3.55	.438	0.829	0.408	NS
22-25	3.46	.337			

Legend: S.D.- Standard Deviation, NS- Not Significant at 0.05 Level of Significance

Table 3. Perceived barriers in sexual health assessment when grouped according to age

Religion	Mean	SD	T- value	P-value	Interpretation
Roman Catholic	3.57	.407	1.320	0.189	NS
Non- Roman Catholic	3.46	.523			

Legend: S.D.- Standard Deviation, NS- Not Significant at 0.05 Level of Significance

Sex	Mean	SD	U- value	P-value	Interpretation
Female	3.56	.446	1.028	0.305	NS
Male	3.49	.372			

Legend: S.D.- Standard Deviation, NS- Not Significant at 0.05 Level of Significance

Table 4. Perceived barriers in sexual health assessment when grouped according to Religion

Undergraduate Program	Mean	SD	F-value	P-value	Interpretation
BS Biochemistry (BCH)	3.72	.360			
BS Biotechnology (BT)	3.30				
BS Medical Laboratory and Science (MLS)	3.54	.488			
BS Radiologic Technology (RT)	3.44	.422			
BS Nuclear Medicine Technology (NMT)	3.47	.125	0.927	0.503	NS
BS Pharmacy (BSP)	3.49	.403			
BS Nursing (BSN)	3.60	.433			
BS Physical Therapy (PT)	3.48	.459			
BS Occupational Therapy (OT)	3.79	.362			
BS Speech and Language Pathology (SLP)	3.59	.330			

Legend: S.D.- Standard Deviation, NS- Not Significant at 0.05 Level of Significance

Table 5. Perceived barriers in sexual health assessment when grouped according to Undergraduate Program

Year Level	Mean	SD	F-value	P-value	Interpretation
1st Year	3.50	.416			
2nd Year	3.54	.489	0.687	0.602	NS
3rd Year	3.60	.405			
4th Year	3.51	.363			
5th Year	3.23	.064			

Legend: S.D.- Standard Deviation, NS- Not Significant at 0.05 Level of Significance

Table 6. Perceived barriers in sexual health assessment when grouped according to year level

data, hence the 311 total respondents, with only 183 of them being able to proceed to answering the questionnaire proper since they had been asked to have a sexual health assessment which is one of the inclusion criteria in this study. Therefore, the computed margin of error for this study was 7%.

Recommendations

In order to address the *highly important barrier and the important barriers* that were identified, the student researchers would like to recommend that during the annual medical exam, the school clinic may provide separate rooms for female and male students and an available examiner of the same sex so that they will be encouraged to have sexual health assessment. Also, short seminars may be conducted about the importance of sexual health assessment prior to procedure and also by enhancing the discussion of what sexual health is and what sexual health assessment is in classes.

Furthermore, since there are numerous students who had not been to have a sexual health assessment despite being a part of the annual medical examination, the school clinic may implement measures in order to make sure that the students know that they can avail these services, such as posting advertisements around the campus and talking to the students about sexual health

during general assessments. Moreover, future researchers may conduct the same type of study in different settings such as in the workplace, community, and other schools to know the barriers perceived by people in these settings since this study was limited to young adults only. They may also improve and modify the self-made questionnaire depending on the locale under investigation. Meanwhile, the scope can also be expanded to gain more respondents.

In addition, the study may inspire other institutions to raise awareness about the importance of sexual health assessment among their students and to their employees as well. Lastly, the nurses may know that when conducting a sexual health assessment, they should know about the procedure to explain it clearly to the patients, and other factors that affect the willingness of the patients such as their personal beliefs and attitudes.

V. Acknowledgment

The researchers would like to express their deepest gratitude to the following individuals, whose contributions led to the development of this study.

First of all, the researchers would like to express their heartfelt appreciation to their families and friends who supported them physically, emotionally and mentally, in the course of doing this research study.

Without them, this research study would not have been possible.

The researchers would also like to express their deepest gratitude to their research adviser, Daisy H. Alberto, RN, MAN, PhD, their research professor, Restituta C. Tan, RM, RN, MAN, RGC, PhD, their thesis review panel, and ethics committee, Ailene M. Maclid RN, MAN; Ina G. Ragotero DMD, RN, LPT; Naomi M. De Aro, RN, Man, EdD, and Celso P. Pagatpatan Jr., RN, MSN, DRPH, for guiding the researcher step-by-step through the whole process and for sharing their knowledge, insights and comments that led to the betterment of the study.

The researchers would also like to thank their research instrument validators, Noel P. Ligaya RN, MAN, DNM; Roberto Sombillo RN, MAN, PhD; and Monina G. Dimas, RN, MAN, their statistician, Janice T. Ilano, LPT, MA, and their editor, John Vincent K. Forteza, MAESL, LPT, for evaluating the research tool that was used in this study, for assisting the student researchers with the statistical treatment of data, and for ensuring the correct use of the English language and correct application of the APA Style in the manuscript, respectively.

To the student council presidents of every undergraduate college, batch representatives of each program, class presidents of each class in every undergraduate program, and to the CRS Help Desk, for helping the researchers disseminate their questionnaires to the target respondents; and to the undergraduate students of DLSMHSI for sharing their time participating in this study.

Most especially to the Lord our God, for giving the researchers the will, patience, energy, and wisdom to complete this study. Without His divine power, this study would not have been accomplished.

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