ISSN 3028-1601

University of the Visayas

COLLEGE OF ALLIED HEALTH SCIENCES

JOURNAL OF HEALTH SCIENCES

Volume 1, 2023

(032) 253 6173
info@uv.edu.ph
www.universityofthevisayas.com

ISSN 3028-1601

Editorial Board

FOREWORD

Welcome to our Journal of Health Sciences, a space where curiosity meets discovery. In this journal, we embark on a shared journey of exploration, innovation, and collaboration in the field of healthcare.

Within these pages, you'll encounter the fruits of passion and dedication from our faculty and students. Their work reflects not only their expertise but also their unwavering commitment to advancing healthcare for all. From groundbreaking research findings to insightful discussions on healthcare policies, each contribution adds a valuable piece to the puzzle of improving human well-being.

We sincerely thank all of the authors, reviewers, and readers who have contributed to this Journal. Your collective efforts are what make this endeavor possible, and we are grateful for your contributions.

As we turn the pages of this journal, let us be inspired by the possibilities that lie ahead. Together, let's continue to push the boundaries of knowledge and strive for a healthier, more equitable future.

With warmest regards,

Leonel Paolo S. Rodriguez, MSc, LPT
Editor-in-chief, Journal of Health Sciences
College of Allied Health Sciences
University of the Visayas

The Journal of Health Sciences Editors Volume 1, Issue 1 (2023)

Table of Contents

POLICIES AND GUIDELINES

Contributors to the Journal of Health Sciences (JOHS) of the College of Allied Health Sciences, University of the Visayas must prepare the publishable article in accordance with these parameters. These are designed to standardized the process of preparing the journal for publication. Failure to keep n with this reference may culminate in the rejection for publication. Finally, the Journal of Health Sciences will publish one volume annually, comprising two issues per year.

SUBMISSION OF MANUSCRIPTS

All manuscripts shall be sent electronically to cahs_frs@uv.edu.ph. JOHS considers all health research articles on the condition that they:

- ✓ are original
- ✓ are the property of the researcher
- ✓ have not been submitted for publication elsewhere
- ✓ have not been published already unless permission to republish was sought
- ✓ are not under consideration for publication elsewhere
- ✓ use respectful language

The JOHS may require the author/s to submit additional documents when necessary for authentication purposes.

POLICY ON CONFLICTS OF INTEREST

The JOHS will only publish articles after the author/s have confirmed that they have disclosed all potential conflicts of interest.

Disclosure of the Conflict of Interest. All sponsors supporting the work including all the institutions involved must be acknowledged in text. All sponsors and institution involved must be notified for the submission of the article for publication. This includes declaration of no commercial association that may pose conflict of interest. It is the researcher's sole responsibility to any issues pertaining to this matter.

AUTHORSHIP

Authors Undertaking. Authorship undertaking does not only involve the very people who actually formulate and introduce the idea or perform the experiments or field works necessary for the paper but also include those who make the undertaking possible, such as providing logistical, technical, or financial support and the likes.

1) The author must first acquire an application form for authorship, declaration of authorship and copyright form, and the IRB clearance that comes with the paper or manuscript. Forms are available in the office of the UV-IRB.
2) After filling up the forms, the author may either submit them personally, together with the IRB clearance and a soft copy of the paper or manuscript, to the Editorial Board, or by electronic mail. There must ne one set of forms or requirements for every paper.

Originality Undertaking. An undertaking of originality in publication is an undertaking not only of honesty and integrity but of the pursuit of new ideas, the very rationale of publication itself.

1) Authors must first choose a topic or subject for their paper and search out for existing works of similar idea with that of their own and

determine whether the similarity between them is not close enough for either of them to be identical with the other, unless if the paper is comparative by nature.

2) Authors must not overly rely upon or absorb the entire substance of other published works and should try to innovate and create new ideas. Authors may use the postulations of other works to either refute them or make a new approach off of them,
3) Authors must and always make a citation of their references.

ETHICAL CONSIDERATIONS

Policy on Use of Human Subjects in Research. The JOHS will only publish research articles involving human subjects after the author/s have verified that they have followed all laws and regulations concerning the protections afforded human subjects in research studies within the jurisdiction in which a research study they describe was conducted. For research conducted outside the University of the Visayas, the research protocol must have been approved by the appropriate institutional review board (IRB), In the case of exempt research, the IRB must have deemed the research protocol exempt.

Ethics Undertaking. Ethics undertaking is that which maintains the balance of the effects between the naturally aggressive character of the pursuit of knowledge and the establishment of some restrictions on said pursuit of knowledge and the establishment of some restrictions on said pursuit for it to abide with existing societal norms which all members of the society, authors included, must observe.

STEPS:

1) Authors must procure an acknowledgement form prior to the start of making their paper. The acknowledgement form enumerates the general ethical guidelines that authors must adhere to during the formative course of their paper or manuscript, or in the co-authorship thereof. They are to affix their

signatures on the form to acknowledge full understanding and comprehension and compliance with the guidelines.

2) Authors must submit to the editorial board, together with the finished paper or manuscript and the required forms of authorship, the IRB clearance that certifies compliance with the ethical guidelines set forth by their research institution, either personally or by electronic mail.

IRB Exemption. Some studies may need not to undergo IRB process. However, JOHS requires the researcher/s to submit IRB Exempt clearance. These include:

1) Research conducted in established or commonly accepted educational settings, involving normal education practices.
2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement) survey procedures, interview procedures or observation of public behavior.
3) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.
4) Research and demonstration projects which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine procedures or programs.
5) Tast and food quality evaluation and consumer acceptance studies.

IRB Approval Certification. Researcher/s who are unable to present IRB Exempt Clearance must obtain a certification indicating that the/ir research obtained IRB approval prior to the conduct of the study.

GRAMMAR CHECK

JOHS utilizes Grammarly to aid in guarding the quality of sentence structure of accepted manuscripts for publication. It is a comprehensive grammar editing tool that checks the text for the proper use of more than 250 common and advanced grammar rules. Grammatical errors are categorized, clearly displayed, and organized for review and revision.

PLAGIARISM CHECK

The JOHS utilizes the Turnitin originality checker to determine the Similarity Index. It generates originality report by proving a summary of similar text from its database. Direct Quotation and Refences List are excluded in the report. Only content of the manuscripts are considered for text matching.

Similarity Check. Turnitin recommends that the final arbiter in excluding materials should based in human judgement. The editor-in-chief determines which materials are not contextually related to the submitted manuscript and manually excludes them in the report. Matches less than 6 words are also excluded.

Originality Scoring. Manuscript with an originality rating of 90% and above will be included in the journal without revision. A rating of 51% to 89% will be returned to the author/s for revision. Ratings below 51% will be rejected.

Transmittal of Similarity Index Result. The report will be printed and transmitted to the author/s for manuscript revision.

COPYRIGHT POLICY

The author/s shall retain all copyrights of their contribution. All other elements of the journal including its name, structure, and organization are also protected by copyright and are the property of the College of Allied Health Sciences, University of the Visayas.

Declaration of Previous Publication. The author/s must declare any form of print and online publication before the actual release of the journal. Consideration

for full or partial reprint, including abstracts, of the article needs approval from the JOHS. This includes publication of conference proceedings. If JOHS allows to reprint, permission letter to reprint from the editor-in-chief of the previous prints must be sought.

Policy for Handling Complaints. If JOHS receives a complaint that any contribution to the Journal infringes copyright or other intellectual property rights or contains materials inaccuracies, libelous materials or otherwise unlawful materials. JOHS will investigate the complaint. Investigation may include a request that the parties involved substantiate their claims. The Journal will make a good faith determination whether to remove the allegedly erroneous material. A decision not to remove material should represent the Journal's belief that the complaint is without sufficient foundation, or if well-founded, that a legal defense or exemption may apply, such as fair use in the case of copyright infringement or truthfulness of a statement in the case of libel. JOHS should document its investigation and decision.

Mental Health and Emotion Regulation Among Nursing Students During Covid-19 Pandemic

Princess Baja
Jeak Marie Vito
Joepit Paraginog
Kent Mark Alfarero
Jelly Rose Cinco
Jungie Mae Caluscusan
Cindy Arriesgado
Jobel Lopez
Blessy Marie Cueva
Rhina Dela Cruz
John Joseph Valencia
Cheeney Hernando
Yvonne Sevilla
Armida Guiterrez

Department of Nursing, College of Allied Health Sciences, University of the Visayas

ABSTRACT

The COVID-19 outbreak significantly impacted nursing students' mental health and emotion regulation at the University of the Visayas during the first quarter of the A.Y. 2021-2022. This quantitative descriptive correlational study with 166 participants aimed to assess the interrelationship of profile, mental health, and emotion regulation. Standardized questionnaires (GAD-7, PHQ-9, ERQ) were used to gather data. The results showed a significant relationship between sex and anxiety status, but no significant links between age, year level, living area, and anxiety status. Depression status had no significant relationship with the respondents' profile. Furthermore, no significant relationships were found between profile and emotion regulation (both cognitive reappraisal and expressive suppression). However, a significant relationship was observed between mental health status and cognitive reappraisal.

Keywords: Mental Health, Emotion Regulation, Nursing Students

INTRODUCTION

The COVID-19 pandemic has caused significant disruptions to our lives, impacting peace, normalcy, and the global economy. The highly contagious nature

of the virus led to widespread suffering and affected billions of people worldwide, straining healthcare systems and institutions. Measures like lockdowns and lifestyle changes have taken a toll on everyone's well-being, including nursing students at the University of the Visayas. The new normal education setup has negatively affected their mental health, leading to increased stress, anxiety, and depression as they adapt to new academic challenges. The uncertainty of the future has also been a cause for concern.

The COVID-19 outbreak caused universities to delay the start of classes, leading to a shift from traditional campus-based nursing education to online teaching as the primary method. Hospital internships and clinical practice were suspended due to the pandemic. While quarantine was effective in preventing infection, it also resulted in negative psychological effects, including post-traumatic stress symptoms and confusion, which require attention.

The implementation of the new education setup by the Commission of Higher Education (CHED) has made learning more difficult for nursing students. Some topics are not discussed in-depth, and external distractions like poor internet connection, noisy environments, and other distractions hinder their focus during discussions, leading them to rely heavily on Google for learning. Additionally, the suspension of Real-Life Experience (RLE) and clinical duties due to COVID-19 restrictions deprives nursing students of vital clinical knowledge and skills needed for their future roles as frontline healthcare workers. This situation has led to negative thinking, pessimism about their future, feelings of incompetence, and fear of failing the board exam. Consequently, nursing students are experiencing mental breakdowns, high stress levels, emotional depression, and fear due to these challenges and uncertainties.

Recent research examining various populations, including frontline healthcare workers, the general population, and students, has found a high prevalence of mental health issues during the COVID-19 pandemic (Cao et al.,

2020; Shi et al., 2020; Xiao et al., 2020). Many surveys were conducted during the pandemic to investigate the relationship between pandemic-related factors and mental health problems. Emotion regulation dysfunction has also been linked to depression and anxiety (Young et al., 2019). Emotion regulation refers to the process of adjusting the frequency, intensity, and duration of emotions over time (Gross, 2015). Emotion regulation strategies encompass specific methods individuals use to manage their emotions (Koole, 2009).

According to Gross's Emotion Regulation Model, emotion regulation strategies can be broadly categorized into antecedent-focused and response-focused strategies. Cognitive reappraisal is an antecedent-focused strategy that involves redefining the meaning of an emotion-eliciting situation before a full emotional response is generated. On the other hand, expressive suppression is a response-focused strategy that involves inhibiting behavioral expressions in response to emotionally stimulating events (Gross & John, 2003). Both expressive suppression and cognitive reappraisal are common emotion regulation strategies, and numerous studies have investigated their relationship with psychological problems. Most studies have found that greater cognitive reappraisal is associated with better psychological well-being and fewer mental health issues (Cludius *et al*., 2020).

On the contrary, the relationship between expressive suppression and psychological symptoms was found to be different, as stated in the study by Cameron & Overall (2018). However, the evidence regarding the link between emotion regulation and the development of psychopathology is limited and mixed, as mentioned in the study by Cludius *et al*. (2020). Emotion regulation undergoes changes throughout different stages of life, with early adulthood being a crucial period for developing habits and abilities to regulate emotions later in life (Gross, 2015). Since college students, including nursing students, are considered early adults, their emotional regulation and mental health status have garnered attention during the COVID-19 pandemic. However, there is currently a lack of studies on

emotional regulation and its correlation with mental health issues among nursing students specifically during the COVID-19 outbreak.

The main objective of the research study is to investigate the mental health and emotional regulation experiences of nursing students at the University of the Visayas during the COVID-19 pandemic. The researchers hypothesize that good emotional and mental health are crucial for building resilience and self-awareness, enabling individuals to cope with challenges and adversities effectively. Mentally strong individuals can face difficulties with clarity and persistence, which is particularly valuable during a pandemic. Ultimately, the study's findings aim to enhance the understanding of the link between mental health and emotion regulation, which can assist nurses in addressing and managing mental and emotional issues among their patients.

METHODOLOGY

Design

In this research, a quantitative descriptive correlational research design was employed. The descriptive research design aims to systematically describe a phenomenon, situation, or population by answering what, when, where, and how questions related to the research problem. It does not attempt to establish causation or manipulate variables; instead, it identifies, observes, and measures the variables of interest. Correlational research, a type of non-experimental method, involves measuring two variables and assessing the statistical relationship between them without any manipulation or influence from extraneous variables.

This study utilized a descriptive correlational research design, aiming to describe relationships among variables without establishing causation. The severity of respondents' experiences was used to identify those in need of medical attention. Descriptive analysis was employed to report on circumstances, such as the relationship between mental health and emotion regulation. It is a quantitative study as it involved statistical explanations of the data, including the number of

participating students and their scores related to mental and emotional experiences during the COVID-19 pandemic. The main objective was to investigate and characterize the relationship between mental health and emotional regulation among nursing students at the University of the Visayas during the pandemic, providing systematic data about the phenomenon. The study used correlational research to assess the relationship between mental health and emotion regulation without modifying either variable, aiming to determine if there was a connection between these aspects among nursing students at the University of the Visayas.

Research Environment

The study was conducted at the University of the Visayas (UV), a private institution located in Dionisio Jakosalem St, Cebu City, 6000 Cebu, near Collonade Mall and Gaisano Main. UV was founded in 1919 by Vicente Gullas with the aim of providing education to young people from average-income families. Over the years, the university expanded its offerings, including new master's degrees in education, engineering, maritime studies, criminology, and nursing during the 1980s-90s. The institution's core values include Leadership, Empathy, Achievement, Discipline, Service, Environmentalism, Respect, Virtuousness, and Excellence.

The Bachelor of Science in Nursing (BSN) program at the University of the Visayas is a four-year course that includes general education and professional courses. The professional courses focus on nursing concepts and are integrated throughout all four years of study, accompanied by Related Learning Experiences (RLE). The BSN program also includes an intensive nursing practicum to enhance nursing competencies and prepare students to become entry-level nurses. At present, the Nursing department, Pharmacy department, and Dentistry department are collectively known as the College of Allied Health Sciences at the University of the Visayas.

Respondents

The research study aimed to include all nursing students from 1st year to 4th year at the University of the Visayas who were officially enrolled in the first quarter of the A.Y. 2021-2022. The respondents completed a questionnaire to evaluate the impact of the COVID-19 pandemic on their mental health and to explore the relationship between mental health and emotion regulation. The study sought to understand how emotion regulation plays a role in helping nursing students cope with the emotional and mental challenges they encountered during the pandemic and the subsequent lockdown.

Sampling Design

The research study employed a complete enumeration sampling approach, where data was collected from every single unit of the entire population. In this case, the researchers gathered data from all nursing students at the University of the Visayas, including those from the first year to the fourth year, who were officially enrolled in the first quarter of the academic year 2021-2022.

In constructing appropriate strata for sampling, as mentioned by Bhat (2019), the researcher needs to have awareness of all population elements and a clear understanding of the study objective. This helps ensure that the sampling approach is well-suited to the research goals and provides accurate representation of the population.

Inclusion and Exclusion Criteria

The inclusion and exclusion criteria were carefully set to enhance the study's external and internal validity, feasibility, cost-effectiveness, and ethical considerations. By using effective selection criteria, the researchers aimed to minimize confounding factors and increase the likelihood of uncovering the relationship between exposure and outcomes.

The inclusion criteria ensured that the respondents capable of participating in the research met specific requirements. In this study, all nursing students from

the University of the Visayas who were currently enrolled in the first quarter of the A.Y. 2021-2022 were included as participants. On the other hand, the exclusion criteria were used to identify and exclude respondents who did not possess the necessary characteristics to be part of the study. For example, nursing students who were unwilling to participate or did not answer the questionnaire were considered unqualified and excluded from the research.

Instruments

The researchers employed a standardized questionnaire comprising two sections. The first section gathered demographic information from the respondents, including age, sex, year level, and living area. The second section included three structured scales: the Generalized Anxiety Disorder-7 (GAD-7), Patient Health Questionnaire-9 (PHQ-9), and Emotion Regulation Questionnaire (ERQ). These scales were used to measure anxiety and depression levels and assess the two emotion regulation strategies employed by nursing students during the COVID-19 pandemic.

The Generalized Anxiety Disorder-7 (GAD-7) scale was used to measure the self-reported frequency of anxiety symptoms. The scale employed a normative scoring system, with questions assessing the severity of the patient's anxiety over the past two weeks. Each response category, ranging from 'not at all' to 'nearly every day,' was assigned scores of 0, 1, 2, and 3, respectively. The scores for the seven questions were then added together to calculate the GAD-7 total score, which ranges from 0 to 21. The total score was divided into four grades based on anxiety severity: asymptomatic (0–4), mild (5–9), moderate (10–14), and severe (15–21) anxiety levels.

The Patient Health Questionnaire-9 (PHQ-9) is a widely used screening tool that serves two purposes: identifying individuals with major depression disorder and assessing the severity of depressive symptoms. The questionnaire comprises nine questions, each with four response options: 0 = 'not at all', 1 = 'several days', 2

= 'more than half the days', and 3 = 'nearly every day'. The scores for symptom severity range from 0 to 4 for asymptomatic, 5 to 9 for mild, 10 to 14 for moderate, 15 to 19 for moderately severe, and 20 to 27 for severe depression.

For the diagnosis of major depression disorder, it is necessary for at least five of the nine depressive symptom criteria to be present for "more than half the days" in the past two weeks, including at least one symptom of depressed mood. If two, three, or four depressive symptoms have been present for "more than half the days" in the past two weeks, and one of the symptoms is depressed mood, it is diagnosed as other depression. Additionally, one of the symptom criteria, "thoughts that you would be better off dead or of hurting yourself in some way," counts if present at all, regardless of duration.

The Emotion Regulation Questionnaire (ERQ) is a 10-item self-report scale used to assess the habitual use of two emotion regulation strategies: cognitive reappraisal and expressive suppression. Participants rate each item on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The scale consists of two subscales: cognitive reappraisal (six items) with a possible range of 6-42, and expressive suppression (four items) with a possible range of 4-28. Higher mean scores in each subscale indicate greater use of that particular emotion regulation strategy.

For cognitive reappraisal, items 1, 3, 5, 7, 8, and 10 are used, while items 2, 4, 6, and 9 form the expressive suppression facet. The scoring involves calculating the average of all the scores within each subscale. Higher scores reflect more frequent use of the respective emotion regulation strategy, whereas lower scores indicate less frequent use.

The ERQ has demonstrated good internal consistency reliability, with Cronbach's alpha values of 0.85 for cognitive reappraisal and 0.77 for expressive suppression. Additionally, test-retest reliability showed consistent results, with

values of 0.82 for cognitive reappraisal and 0.79 for expressive suppression (Wang *et al.*, 2017).

Data Gathering Procedure

Data collection involved presenting the study to panels and obtaining necessary permissions. Transmittal letters were sent online to relevant authorities. Respondents were assured of data privacy. Google forms were used for questionnaires, distributed to year-level group chats. Researchers were available to address queries. Participation was voluntary. Data was protected and securely retrieved online. After analysis, answered questionnaires were discarded.

Statistical Treatment of Data

The study employed various correlational and descriptive statistics:

Frequency distribution. Used to determine the profile of nursing students at the University of the Visayas in terms of age, sex, year level, and living area.

Percentage. Used to analyze the total information of respondents' presumed age, sex, year level, and living area.

Addition or summation. Used to determine the total scores for anxiety, depression, and emotion regulation, aiding in constructing the frequency table.

Pearson r Correlation Coefficient. Utilized to determine if there is a correlation between mental health and emotion regulation.

ANOVA Test. Utilized to determine if there is a correlation between the profile variables and mental health, as well as the profile variables and emotion regulation.

RESULTS AND DISCUSSION

Table 1. Profile of the Respondents

Profiles	*n*	Percentage
Age (year)		
20 years old and below	66	39.8
21 – 25 years old	77	46.4
26 years old and above	23	13.9

Sex		
Male	34	20.5
Female	132	79.5
Year Level		
Level I	39	23.5
Level II	68	41.0
Level III	49	29.5
Level IV	10	6.0
Living Area		
Urban	103	62.0
Sub-urban	58	34.9
Rural	5	3.0

Table 1 presents the demographic profile of nursing students at the University of the Visayas. Out of 249 eligible students, 166 participated in the study, resulting in a retrieval rate of approximately 67%. The majority of respondents (46.4%, n=77) were aged 21 to 25, while 39.8% (n=66) were aged 20 and below, and 13.9% (n=23) were aged 26 and above. In terms of sex, 79.5% (n=132) of respondents were female, and 20.5% (n=34) were male. Regarding year level, 23.5% (n=39) were first-year, 41.0% (n=68) were second-year, 29.5% (n=49) were third-year, and 6.0% (n=10) were fourth-year nursing students. The majority of respondents (62.0%, n=103) resided in urban areas, while 34.9% (n=58) were from suburban areas, and 3.0% (n=5) from rural areas.

From the demographic results, it can be inferred that the respondents were predominantly in their adolescence and young adulthood. The nursing profession was dominated by female students, which aligns with historical portrayals of nursing as a feminine occupation since the mid-nineteenth century. Traditionally, nursing training favored women over men, leading to the perception of nursing as a female-dominated field.

There have been myths and stereotypes surrounding the association of femininity with nursing and masculinity with other professions. However, research suggests that gender does not significantly influence caring behavior in nursing.

Despite these stereotypes, the notion of femininity in nursing is still stigmatized and discriminated against in some contexts.

Nevertheless, there is a growing trend of more men entering the nursing profession in recent decades, challenging the traditional gender norms and diversifying the nursing workforce.

The study revealed that a significant majority of the respondents were from the second-year, likely due to their availability during the study period. Additionally, the urban area had the highest proportion of respondents, which can be attributed to the University's city location and the survey being conducted during class time.

The location of a school can indeed influences the college experience of students. Urban centers typically offer a wide range of entertainment, recreational activities, and opportunities for students. Moreover, students in urban areas often have access to more internship opportunities, competitive courses, and resources that can enhance their career prospects (Patel, 2021). This may have contributed to the higher representation of second-year students and respondents from urban areas in the study.

Mental Health

Table 2 presents the mental health status of the nursing students during the COVID-19 pandemic, focusing on anxiety and depression. The Generalized Anxiety Disorder-7 (GAD-7) questionnaire was utilized to measure the self-reported frequency of anxiety symptoms, providing a normative scoring system to assess the severity of anxiety over the past two weeks. Additionally, depression was assessed using the Patient Health Questionnaire-9 (PHQ-9) questionnaire, which helped evaluate the frequency of depression symptoms experienced by the respondents during the same period. The table provides an overview of the mental health status of the nursing students in terms of anxiety and depression during the COVID-19 pandemic, as identified in this study.

Table 2. *The Mental Health Status of the Nursing Students during COVID-19 pandemic*

Mental health status	N	Percentage
Anxiety		
Asymptomatic	29	17.5%
Mild	73	44.0%
Moderate	39	23.5%
Severe anxiety	25	15.0%
Depression		
Asymptomatic	31	18.7%
Mild	49	29.5%
Moderate	33	19.9%
Moderately severe	40	24.1%
Severe	13	7.8%

n=66

The study found that during the COVID-19 pandemic, approximately 82.5% (n=137) of the nursing students experienced anxiety. Among them, 44% (n=73) had mild anxiety, 23.5% (n=39) had moderate anxiety, and 15% (n=25) had severe anxiety. Only 17.5% (n=29) of the nursing students did not experience anxiety during the pandemic.

Furthermore, the prevalence of depression among nursing students during the COVID-19 pandemic was approximately 81.3% (n=135). The majority of these students (29.5%, n=49) experienced mild depression, followed by moderately severe depression (24.1%, n=40), and moderate depression (19.9%, n=33). Around 7.8% (n=13) of the nursing students experienced severe depression. Additionally, about 18.7% (n=31) of the respondents did not experience depression during the COVID-19 pandemic.

The prevalence rates of anxiety symptoms among nursing students in the current study appear to be lower compared to the findings of an Israeli study, which reported moderate and severe anxiety prevalence rates of 42.8% and 13.1%, respectively, among nursing students during the COVID-19 pandemic (Savitsky *et al*., 2020).

Additionally, when compared to a meta-analysis of university students during the COVID-19 pandemic, the prevalence rates of anxiety and depression in this study also seem to be lower. The meta-analysis reported a prevalence of anxiety at 31% and depression at 34% among university students (Chang *et al*., 2021).

These variations in prevalence rates may be attributed to different factors such as cultural differences, geographic location, and the specific challenges faced by nursing students during the pandemic. Nonetheless, the findings highlight the importance of addressing mental health concerns among nursing students during such challenging times.

The current findings of this study regarding depression among nursing students align with previous research by Patelarou *et al*., (2021), which showed that nearly one-third of nursing students experienced mild depression. This study's results are consistent with findings from different countries, where nursing students faced varying rates of depression, with Spanish students having the highest rates (59.1%), followed by Albanian students (34.5%), and Greek students (21.8%).

The COVID-19 pandemic has indeed had a significant impact on the mental health of nursing students worldwide (Brouwer *et al*., 2021, Gol and Erkin, 2021). Disruptions in study schedules, restrictions on activities, changes in learning strategies, and other pandemic-related challenges have been linked to depression among nursing students (Zhu *et al*., 2021).

The evidence suggests that the pandemic's impact on mental health is multifaceted, with factors such as limitations on personal freedom, increased social distance, social isolation, lack of exercise, and prolonged time spent at home contributing to depressive thoughts among nursing students (Kalkan Uurlu *et al*., 2021; Li *et al*., 2021b; Qiu *et al*., 2020). These findings underscore the importance of addressing mental health issues and providing support for nursing students during the COVID-19 pandemic.

Emotion Regulation

Table 3 presents the results of the Emotion Regulation Questionnaire (ERQ), which assessed the habitual use of two common strategies for altering emotions: cognitive reappraisal and expressive suppression.

The data showed that a low frequency of cognitive reappraisal was reported by 5.42% (n=9) of the respondents, while expressive suppression was reported by 1.81% (n=3) of the respondents. For the moderate frequency, cognitive reappraisal was used by 42.77% (n=71) of the respondents, and expressive suppression was used by 43.98% (n=73) of the respondents. The study found that during the COVID-19 pandemic, approximately 82.5% (n=137) of the nursing students experienced anxiety. Among them, 44% (n=73) had mild anxiety, 23.5% (n=39) had moderate anxiety, and 15% (n=25) had severe anxiety. Only 17.5% (n=29) of the nursing students did not experience anxiety during the pandemic.

Furthermore, the prevalence of depression among nursing students during the COVID-19 pandemic was approximately 81.3% (n=135). The majority of these students (29.5%, n=49) experienced mild depression, followed by moderately severe depression (24.1%, n=40), and moderate depression (19.9%, n=33). Around 7.8% (n=13) of the nursing students experienced severe depression. Additionally, about 18.7% (n=31) of the respondents did not experience depression during the COVID-19 pandemic. The prevalence rates of anxiety symptoms among nursing students in the current study appear to be lower compared to the findings of an Israeli study, which reported moderate and severe anxiety prevalence rates of 42.8% and 13.1%, respectively, among nursing students during the COVID-19 pandemic (Savitsky *et al*., 2020).

Additionally, when compared to a meta-analysis of university students during the COVID-19 pandemic, the prevalence rates of anxiety and depression in this study also seem to be lower. The meta-analysis reported a prevalence of anxiety at 31% and depression at 34% among university students (Chang *et al*., 2021).

These variations in prevalence rates may be attributed to different factors such as cultural differences, geographic location, and the specific challenges faced by nursing students during the pandemic. Nonetheless, the findings highlight the importance of addressing mental health concerns among nursing students during such challenging times.

The current findings of this study regarding depression among nursing students align with previous research by Patelarou *et al*., (2021), which showed that nearly one-third of nursing students experienced mild depression. This study's results are consistent with findings from different countries, where nursing students faced varying rates of depression, with Spanish students having the highest rates (59.1%), followed by Albanian students (34.5%), and Greek students (21.8%).

The COVID-19 pandemic has indeed had a significant impact on the mental health of nursing students worldwide (Brouwer *et al*., 2021, Gol and Erkin, 2021). Disruptions in study schedules, restrictions on activities, changes in learning strategies, and other pandemic-related challenges have been linked to depression among nursing students (Zhu *et al*., 2021).

The evidence suggests that the pandemic's impact on mental health is multifaceted, with factors such as limitations on personal freedom, increased social distance, social isolation, lack of exercise, and prolonged time spent at home contributing to depressive thoughts among nursing students (Kalkan Uurlu *et al*., 2021; Li *et al*., 2021b; Qiu *et al*., 2020). These findings underscore the importance of addressing mental health issues and providing support for nursing students during the COVID-19 pandemic.

Both cognitive reappraisal and expressive suppression were found to be highly used by the respondents during the COVID-19 pandemic. Cognitive reappraisal had an average of 51.81% (n=86) usage, while expressive suppression had an average of 54.22% (n=90) usage.

These results indicate that nursing students frequently employed both cognitive reappraisal and expressive suppression as emotion regulation strategies during the challenging times of the COVID-19 pandemic.

Table 3. *The Emotion Regulation of Nursing Students during COVID-19 pandemic*

Emotion Regulation	Cognitive Reappraisal		Expressive Suppression	
	n	Percentage	N	Percentage
Low	9	5.42%	3	1.81%
Moderate	71	42.77%	73	43.98%
High	86	51.81%	90	54.22%

n = 166

Emotion regulation refers to the process of controlling the frequency, intensity, and duration of emotions over time (Gross, 2015a). It involves specific methods that individuals use to manage and control their emotions (Koole, 2009). In Gross's Emotion Regulation Model, there are two types of strategies: antecedent-focused and response-focused emotions. Cognitive reappraisal is an antecedent-focused strategy that involves redefining the significance of an emotion-eliciting situation before the emotional response fully develops. On the other hand, expressive suppression is a response-focused strategy that involves suppressing emotional expressions in response to emotionally challenging situations (Gross & John, 2003).

The findings of this study indicate that nursing students at the University of the Visayas showed a lower frequency of using cognitive reappraisal compared to expressive suppression during the COVID-19 pandemic. This preference for emotion regulation strategies might be influenced by individual emotion preferences. People with depression, for example, are less likely to prefer positive emotions over negative ones. Moreover, low cognitive reappraisal was found to be associated with a higher risk of comorbid anxiety and depression in nursing students, which is consistent with previous research. Depressed individuals may be more inclined to use cognitive reappraisal to suppress positive emotions. However,

there are mixed findings in the literature, as some studies have shown no significant differences in cognitive reappraisal between individuals with and without major depressive disorder. Overall, the study highlights the importance of understanding and promoting effective emotion regulation strategies in nursing students during challenging times like the COVID-19 pandemic.

Relationship between Demographic Profile and Mental Health Status

Table 4. *Relationship of Profile and Anxiety*

Relationship	Chi-square		Interpretation	Decision over Ho
	2	p-value		
Anxiety vs Age	4.051	0.670	Not significant	Fail to Reject
Anxiety vs Sex	15.854	0.001	Significant	Reject
Anxiety vs Year Level	5.166	0.820	Not significant	Fail to Reject
Anxiety vs Living Area	5.685	0.459	Not significant	Fail to Reject

Table 4 presents the cross-tabulation of the demographic profiles and anxiety status of nursing students. The results showed that there was a significant relationship between sex and anxiety status ($\chi^2 = 15.584$, $p = 0.001$), indicating that sex was associated with anxiety status, and the null hypothesis was rejected. However, age ($\chi^2 = 4.051$, $p = 0.670$), year level ($\chi^2 = 5.166$, $p = 0.820$), and living area ($\chi^2 = 5.685$, $p = 0.459$) showed no significant relationship with anxiety status, indicating that they were independent variables, and the null hypothesis was not rejected for these factors.

Indeed, the findings align with existing research that suggests young adults and women are more susceptible to experiencing loneliness and mental health issues, including anxiety, during the COVID-19 pandemic. The pandemic has brought about significant challenges, such as limited access to social support and mental health services, which could explain the higherprevalence of anxiety among women who often rely on these resources for coping with psychological distress. These implications highlight the importance of addressing mental health needs,

particularly among young adults and women, during times of crisis like the COVID-19 pandemic. It also underscores the significance of providing accessible and supportive mental health services to help individuals cope effectively with the challenges they face.

The lack of association between age and anxiety status in this study could be attributed to the specific focus on nursing students within a limited age group. It is possible that the age range of the respondents did not capture significant variations in anxiety levels, as the study targeted a specific population of young adults. Additionally, while older adults may have more experience with social isolation and effective emotional regulation, the unique challenges faced by nursing students during the pandemic might have influenced anxiety levels independently of age.

It is important to recognize that different age groups may experience and cope with stressors differently, and further research that includes a broader age range could provide a more comprehensive understanding of the relationship between age and anxiety during the COVID-19 pandemic. Additionally, considering other factors such as individual coping mechanisms, support systems, and personal experiences may offer valuable insights into the complexity of anxiety experiences during times of crisis.

Table 5. *Relationship of Profile and Depression*

Relationship	Chi-square		Interpretation	Decision over Ho
	2	p-value		
Depression vs Age	14.999	0.059	Not significant	Fail to Reject
Depression vs Sex	2.270	0.686	Not significant	Fail to Reject
Depression vs Year Level	10.521	0.570	Not significant	Fail to Reject
Depression vs Living Area	6.896	0.548	Not significant	Fail to Reject

Significant if p<0.05. *n*=166, two-tailed test. Dependent variable = Depression

Table 5 shows the cross-tabulation of depression status and demographic profiles of nursing students. The study found no significant relationships between depression and age (p=0.059), sex (p=0.686), year level (p=0.570), and living area (p=0.548). These profiles were independent of depression status, and the null hypothesis was not rejected.

In contrast to prior research (Komstein *et al*., 1995; Scheibe *et al*., 2003), this study found no significant relationship between depressive symptoms and gender. However, sex differences in depression can be influenced by factors like the passage of time, assessment procedures, and sample selection. Wilhelm and Parker (1994) proposed a 'passage of time' explanation, suggesting that males recall more distant episodes of depression than females. Angst and Dobler-Mikola (1984) found that females had higher depression rates only for episodes 3-12 months before assessment. Additionally, sex differences in depression are more prominent during recurrence rather than the initial episode.

Relationship between Demographic Profile and Emotion Regulation

Table 6. *Relationship between Profile and Cognitive Reappraisal*

Relationship	Chi-square		Interpretation	Decision over Ho
	2	p-value		
Cognitive Reappraisal vs Age	49.375	0.102	Not significant	Fail to Reject
Cognitive Reappraisal vs Sex	1.350	0.509	Not significant	Fail to Reject
Cognitive Reappraisal vs Year Level	2.662	0.850	Not significant	Fail to Reject
Cognitive Reappraisal vs Living Area	5.338	0.254	Not significant	Fail to Reject

Significant if p<0.05. *n*=166, two-tailed test. Dependent variable = Cognitive Reappraisal

Table 6 presented the relationship between demographic profiles and cognitive reappraisal. The results indicated that age, sex, year level, and living area were not significantly related to cognitive reappraisal ($p>0.05$), leading to the researchers failing to reject the null hypothesis. Thus, the sample did not provide sufficient evidence to suggest a connection between demographic profiles and cognitive reappraisal among nursing students at the University of the Visayas Campus.

The study's findings contradicted existing literature, which suggests that older individuals tend to use cognitive reappraisal more than younger individuals (Charles & Carstensen, 2007; Folkman *et al*., 1987; Gross *et al*., 1997). Differences between studies may stem from variations in methodologies, sample characteristics, or analytical approaches. For instance, discrepancies with Folkman *et al*. (1987) might be due to using a different measure of reappraisal or a distinct sample profile (e.g., only married couples of middle to older age).

CONCLUSION

The research findings highlight the prevalence of anxiety and depression among nursing students at the University of the Visayas during the Covid-19 pandemic. Given the challenges faced by students in this context, their mental health deserves special attention. The study underscores the importance of understanding the psychological impact of the pandemic on nursing students and the relevance of emotion regulation, particularly cognitive reappraisal, in managing mental health issues. Future research should explore the long-term effects of emotional regulation during and after the pandemic. Developing effective emotion regulation strategies, such as strengthening cognitive reappraisal and reducing expressive suppression, may help mitigate the negative effects of the pandemic on mental health. Emotion regulation emerges as a crucial psychological intervention strategy in this context.

REFERENCES

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review, 30*(2), 217–237. https://doi.org/10.1016/j.cpr.2009.11.004

Alici, N. K., & Copur, E. O. (2021). Anxiety and fear of COVID-19 among nursing students during the COVID-19 pandemic: A descriptive correlation study. Perspectives in psychiatric care.

Bao, Y., Sun, Y., Meng, S., Shi, J., & Lu, L. (2020). 2019-nCoV epidemic: address mental health care to empower society. The Lancet, 395(10224), e37–e38. https://doi.org/10.1016/S0140-6736(20)30309-3

Barthorpe, D. A., Winstone, L., Mars, D. B., & Moran, P. P. (2020). Is social media screen time really associated with poor adolescent mental health? A Time Use Diary Study. *Journal of Affective Disorders*, *274*, 864–870. https://doi.org/10.1016/j.jad.2020.05.106

Brans, K., Koval, P., Verduyn, P., Lim, Y. L., & Kuppens, P. (2013). The regulation of negative and positive affect in daily life. Emotion, 13(5), 926–939. https://doi.org/10.1037/a0032400

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The Psychological Impact of Quarantine and How to Reduce it: Rapid Review of the Evidence. The Lancet, 395(10227), 912–920. https://doi.org/10.1016/S0140-6736(20)30460-8

Brouwer, K. R., Walmsley, L. A., Parrish, E. M., McCubbin, A. K., Welsh, J. D., Braido, C. E. C., & Okoli, C. T. C. (2021). Examining the associations between self-care practices and psychological distress among nursing students during the COVID-19 pandemic. Nurse Education Today, 100, 104864. https://doi.org/10.1016/j.nedt.2021.104864

Butler, E. A., Egloff, B., Wilhelm, F. H., Smith, N. C., & Erickson, E. (86). A., & Gross, JJ (2003). The social consequences of expressive suppression. Emotion, 3(1), 48-67.

Cameron, L. D., & Overall, N. C. (2018). Suppression and expression as distinct emotion-regulation processes in daily interactions: Longitudinal and meta-analyses. Emotion, 18(4), 465.

Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. Psychiatry Research, 287, 112934. https:// doi.org/10.1016/j.psychres.2020.112934

Chang, J.-J., Ji, Y., Li, Y.-H., Pan, H.-F., & Su, P.-Y. (2021). Prevalence of anxiety symptom and depressive symptom among college students during COVID-19 pandemic: A meta-analysis. Journal of Affective Disorders, 292, 242–254. https://doi.org/10.1016/j.jad.2021.05.109

Chang, J., Yuan, Y., & Wang, D. (2020). Mental health status and its influencing factors among college students during the epidemic of COVID-19. Nan fang yi ke da xue xue bao= Journal of Southern Medical University, 40(2), 171-176.

Cludius, B., Mennin, D., & Ehring, T. (2020). Emotion regulation as a transdiagnostic process. Emotion, 20(1), 37.

Cornine, A. (2020). Reducing Nursing Student Anxiety in the Clinical Setting. Nursing Education Perspectives, 41(4), 1. https://doi.org/10.1097/01.nep.0000000000000633

Cummings, C. M., Caporino, N. E., & Kendall, P. C. (2014). Comorbidity of anxiety and depression in children and adolescents: 20 years after. Psychological Bulletin, 140(3), 816–845. https://doi.org/10.1037/a0034733

D'Avanzato, C., Joormann, J., Siemer, M., & Gotlib, I. H. (2013). Emotion Regulation in Depression and Anxiety: Examining Diagnostic Specificity and Stability of Strategy Use. Cognitive Therapy and Research, 37(5), 968–980. https://doi.org/10.1007/s10608-013-9537-0

Dewart, G., Corcoran, L., Thirsk, L., & Petrovic, K. (2020). Nursing education in a pandemic: Academic challenges in response to COVID-19. Nurse Education Today, 92, 104471. https://doi.org/10.1016/j.nedt.2020.104471

De Los Santos, J. A. A., Labrague, L. J., & Falguera, C. C. (2021). Fear of COVID-19, poor quality of sleep, irritability, and intention to quit school among nursing students: A cross-sectional study. Perspectives in Psychiatric Care. https://doi.org/10.1111/ppc.12781

Diehl, M., Coyle, N., & Labouvie-Vief, G. (1996). Age and sex differences in strategies of coping and defense across the life span. Psychology and aging, 11(1), 127.

Domes, G., Schulze, L., Böttger, M., Grossmann, A., Hauenstein, K., Wirtz, P. H., Heinrichs, M., & Herpertz, S. C. (2009). The neural correlates of sex differences in emotional reactivity and emotion regulation. Human Brain Mapping, 31(5), 758–769. https://doi.org/10.1002/hbm.20903

Dutta, S., Ambwani, S., Lal, H., Ram, K., Mishra, G., Kumar, T., & Varthya, S. B. (2021). The Satisfaction Level of Undergraduate Medical and Nursing Students Regarding Distant Preclinical and Clinical Teaching Amidst COVID-19 Across India.

Advances in Medical Education and Practice, 12, 113–122. https://doi.org/10.2147/AMEP.S290142

Ellis, A. J., Vanderlind, W. M., & Beevers, C. G. (2012). Enhanced Anger Reactivity and Reduced Distress Tolerance in Major Depressive Disorder. Cognitive Therapy and Research, 37(3), 498–509. https://doi.org/10.1007/s10608-012-9494-z

Gao, J., Zheng, P., Jia, Y., Chen, H., Mao, Y., Chen, S., Wang, Y., Fu, H., & Dai, J. (2020). Mental health problems and social media exposure during COVID-19 outbreak. PLoS One, 15(4), e0231924. https://doi.org/10.1371/journal.pone.0231924

Göl, İ., & Erkin, Ö. (2021). Mental status of nursing students assessed using the general health questionnaire during the COVID-19 pandemic in Turkey. Perspectives in Psychiatric Care. https://doi.org/10.1111/ppc.12740106(1), 95–103. https://doi.org/10.1037/0021-843x.106.1.95

Harries, A. J., Lee, C., Jones, L., Rodriguez, R. M., Davis, J. A., Boysen-Osborn, M., Kashima, K. J., Krane, N. K., Rae, G., Kman, N., Langsfeld, J. M., & Juarez, M. (2021). Effects of the COVID-19 pandemic on medical students: a multicenter quantitative study. BMC Medical Education, 21(1). https://doi.org/10.1186/s12909-020-02462-1

Heilferty, C. M., Phillips, L. J., & Mathios, R. (2021). Letters from the pandemic: Nursing student narratives of change, challenges and thriving at the outset of COVID-19. Journal of AdvancedNursing. https://doi.org/10.1111/jan.14862

Meo, S. A., Alhowikan, A. M., Al-Khlaiwi, T., Meo, I. M., Halepoto, D. M., Iqbal, M., ... & Ahmed, N. (2020). Novel coronavirus 2019-nCoV: prevalence, biological and clinical characteristics comparison with SARS-CoV and MERS-CoV. Eur Rev Med Pharmacol Sci, 24(4), 2012-2019.

Millgram, Y., Sheppes, G., Kalokerinos, E. K., Kuppens, P., & Tamir, M. (2019). Do the ends dictate the means in emotion regulation? Journal of Experimental Psychology: General, 148(1), 80–96. https://doi.org/10.1037/xge0000477

Moore, S. A., Zoellner, L. A., & Mollenholt, N. (2008). Are expressive suppression and cognitive reappraisal associated with stress-related symptoms? Behaviour Research and Therapy, 46(9), 993–1000. https://doi.org/10.1016/j.brat.2008.05.001

Mustafa, R. M., Alrabadi, N. N., Alshali, R. Z., Khader, Y. S., & Ahmad, D. M. (2020). Knowledge, Attitude, Behavior, and Stress Related to COVID-19 among Undergraduate Health Care Students in Jordan. European Journal of Dentistry, 14(S 01), S50–S55. https://doi.org/10.1055/s-0040-1719212

Nolen-Hoeksema, S., & Aldao, A. (2011). Gender and age differences in emotion regulation strategies and their relationship to depressive symptoms. Personality and Individual Differences, 51(6), 704–708. https://doi.org/10.1016/j.paid.2011.06.012

O'Flynn-Magee, K., Hall, W., Segaric, C., & Peart, J. (2020). GUEST EDITORIAL: The impact of Covid-19 clinical practice hours in pre-licensure registered nurse programs. Teaching and Learning in Nursing. https://doi.org/10.1016/j.teln.2020.07.007

Patelarou, A., Mechili, E. A., Galanis, P., Zografakis-Sfakianakis, M., Konstantinidis, T., Saliaj, A., Bucaj, J., Alushi, E., Carmona-Torres, J. M., Cobo-Cuenca, A. I., Laredo-Aguilera, J. A., & Patelarou, E. (2021). Nursing students, mental health status during COVID-19 quarantine: evidence from three European countries. Journal of Mental Health,https://doi.org/10.1080/09638237.2021.1875420

Sachs-Ericsson, N., Carr, D., Sheffler, J., Preston, T. J., Kiosses, D., & Hajcak, G. (2019). Cognitive reappraisal and the association between depressive symptoms and perceived social support among older adults. Aging & Mental Health, 1–9. doi:10.1080/13607863.2019.1698516 downloaded on 2019-12-29

Sahu, P. (2020). Closure of universities due to coronavirus disease 2019 (COVID-19): Impact on education and mental health of students and academic staff. Cureus, 12 (4), e7541. journals. sagepub. com/doi/full/10.1177/0020764020961801.

Savitsky, B., Findling, Y., Ereli, A., & Hendel, T. (2020). Anxiety and coping strategies among nursing students during the COVID-19 pandemic. Nurse Education in Practice, 46(102809). https://doi.org/10.1016/j.nepr.2020.102809

Shi, L., Lu, Z.-A., Que, J.-Y., Huang, X.-L., Liu, L., Ran, M.-S., Gong, Y.-M., Yuan, K., Yan, W., Sun, Y.-K., Shi, J., Bao, Y.-P., & Lu, L. (2020). Prevalence of and Risk Factors Associated With Mental Health Symptoms Among the General Population in China During the Coronavirus Disease 2019 Pandemic. AMA Network Open, 3(7). https://doi.org/10.1001/jamanetworkopen.2020.14053

Spaapen, D. L., Waters, F., Brummer, L., Stopa, L., & Bucks, R. S. (2014). The emotion regulation questionnaire: validation of the ERQ-9 in two community samples. Psychological Assessment, 26(1), 46.

Sun, Y., Wang, D., Han, Z., Gao, J., Zhu, S., & Zhang, H. (2020). Disease Prevention Knowledge, Anxiety, and Professional Identity during COVID-19 Pandemic in Nursing Students in Zhengzhou, China. Journal of Korean Academy of Nursing, 50(4), 533–540. https://doi.org/10.4040/jkan.20125

Swift, A., Banks, L., Baleswaran, A., Cooke, N., Little, C., McGrath, L., Meechan-Rogers, R., Neve, A., Rees, H., Tomlinson, A., & Williams, G. (2020). COVID-19 and student nurses: A view from England. Journal of Clinical Nursing, 29(17-18), 3111–3114. https://doi.org/10.1111/jocn.15298

Taylor, R., Thomas-Gregory, A., & Hofmeyer, A. (2020). Teaching empathy and resilience to undergraduate nursing students: A call to action in the context of covid-19. Nurse Education Today, 94, 104524. https://doi.org/10.1016/j.nedt.2020.104524

The Lancet. (2019). Social media, screen time, and young people's mental health. The Lancet, 393(10172), 611. https://doi.org/10.1016/s0140-6736(19)30358-7

Troy, A. S., Shallcross, A. J., Brunner, A., Friedman, R., & Jones, M. C. (2018). Cognitive reappraisal and acceptance: Effects on emotion, physiology, and perceived cognitive costs. Emotion, 18(1), 58–74. https://doi.org/10.1037/emo0000371

Troy, A. S., Shallcross, A. J., & Mauss, I. B. (2013). A Person-by-Situation Approach to Emotion Regulation. Psychological Science, 24(12), 2505–2514. https://doi.org/10.1177/0956797613496434

Tung, Y.-J., Lo, K. K. H., Ho, R. C. M., & Tam, W. S. W. (2018). Prevalence of depression among nursing students: A systematic review and meta-analysis. Nurse Education Today, 63, 119–129. https://doi.org/10.1016/j.nedt.2018.01.009

UNESCO (2020). Education: From disruption to recovery. Retrieved 28 June 2020, from https://en.unesco.org/covid19/educationresponse.

Viner, R. M., Russell, S. J., Croker, H., Packer, J., Ward, J., Stansfield, C., Mytton, O., Bonell, C., & Booy, R. (2020). School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review. The Lancet Child & Adolescent Health, 4(5). https://doi.org/10.1016/s2352-4642(20)30095-

Xiao, C. A novel approach of consultation on 2019 novel coronavirus (COVID-19)-related psychological and mental problems: Structured letter therapy. Psychiatry Investig. 2020; 17 (2): 175–6. PubMed: https://pubmed. ncbi. nlm. nih. gov/32093461.

Xiao, X., Zhu, X., Fu, S., Hu, Y., Li, X., & Xiao, J. (2020). Psychological impact of healthcare workers in China during COVID-19 pneumonia epidemic: A multi-center cross-sectional survey investigation. Journal of Affective Disorders, 274, 405–410. https://doi.org/10.1016/j.jad.2020.05.081

Young, K., Sandman, C., & Craske, M. (2019). Positive and Negative Emotion Regulation in Adolescence: Links to Anxiety and Depression. Brain Sciences, 9(4), 76. https://doi.org/10.3390/brainsci9040076

Zhai, Y., & Du, X. (2020). Addressing collegiate mental health amid COVID-19 pandemic. Psychiatry. Research, 288, 1-2.

Zhai, Y., & Du, X. (2020). Mental health care for international Chinese students affected by the COVID-19 outbreak. The Lancet Psychiatry, 7(4), e22. https://doi.org/10.1016/s2215-0366(20)30089-4

Larvicidal Effect of *Blumea balsamifera* Granules Against *Aedes aegypti* Larvae

Ivy Mae Acal
Banjo Khalil Banding
Shwivyrltz Dane Esplanada
Krystine Jaze Soriano
Serene Desiree Sacramento

Department of Pharmacy, College of Allied Health Sciences, University of the Visayas

ABSTRACT

Research on Sambong essential oil's medicinal uses is extensive, but its potential as a larvicide against Ae. aegypti mosquitoes is underexplored. This study assesses larvicidal granules with Sambong essential oil against Ae. aegypti larvae, using a posttest-only design. Granules induced larval mortality in a concentration-dependent manner, showing effectiveness at 100% concentration and persisting at 75% and 100%. No significant difference was found in efficacy compared to the commercial larvicide Abate 1SG. Sambong granules demonstrate strong larvicidal activity, offering a potential alternative to synthetic larvicides to prevent resistance development.

Keywords: *Ae aegypti, Blumea balsamifera,* larvicidal activity, essential oil, granules, Abate 1SG

INTRODUCTION

Mosquitoes have caused more fatalities throughout history than all recorded battles combined, as reported by the Illinois Department of Public Health in 2017. Among the most significant global threats posed by mosquitoes is the Dengue virus, which endangers billions of lives annually. Despite the existence of over 3,000 mosquito species, the prominent female Aedes aegypti mosquito stands out as the primary carrier of Dengue, capable of swiftly transmitting the virus. This has elevated Dengue to a critical global health concern, as highlighted by the World

Health Organization in 2007. Research by Khetarpall & Khanna (2016) underscores that the spectrum of Dengue symptoms and severity spans from asymptomatic cases to potentially lethal conditions such as Dengue shock syndrome (DSS), with moderate cases falling under the category of dengue fever (DF).

The majority of mosquito species tend to inhabit areas near stagnant water. Depending on the specific species, they are capable of laying an estimated 100 to 300 eggs in a single batch. According to Hansen (2020), Ae. aegypti mosquitoes have a particular preference for depositing large clusters of individual eggs on the moist inner walls of containers that hold water. These eggs start off white but rapidly darken to a glossy black hue. The proliferation of Aedes mosquitoes is particularly notable in urban settings, where a multitude of potential breeding sites arise from small water-holding receptacles such as flower vases and plant saucers. Furthermore, the phenomenon of global warming has also contributed significantly to a marked increase in mosquito populations.

Synthetic pesticides are commonly used to control Aedes mosquitoes. However, their incorrect and indiscriminate use has led to environmental damage, harm to non-target organisms, and the emergence of pesticide-resistant insects (Javier *et al*. 2019). Many commercial mosquito repellents contain non-biodegradable synthetics like DEET, DMP, and allethrin, which could pose health and environmental risks under higher exposure (Khater *et al*. 2019). Moreover, the continuous use of synthetic pesticides may contribute to mosquito resistance. Growing concerns for public safety have spurred interest in non-toxic, biodegradable plant-based alternatives.

Due to their effectiveness, minimal harm to natural ecosystems, and limited environmental impact, there is a growing shift towards safe alternatives like botanical products. Additionally, plant secondary compounds have versatile applications as scents, flavors, and medicines. A significant number of plant

species—350 out of 2000—contain bioactive chemicals with specialized mosquito-repellent properties (Ghosh *et al*. 2012, Rao *et al*. 2005, Isman 2006, Javier *et al*. 2018). Plant extracts have been utilized by various researchers to address insect issues. For example, Callosobrochus chinensis Linn exhibited toxicity (LD50 = 0.0854%) against a crude acetone extract of Alpinia pyramidata Blume after 48-hour exposure (Thein *et al*. 2013, Javier 2018). Conversely, P. xylostella displayed resistance to the antifeedant effects of its essential oil (Javier *et al*. 2019).

Anopheles culicifacies Giles, Culex quinquefasciatus Say, Ae. aegypti Linn., Anopheles culicifacies Linn., and other mosquito species have also shown resistance. James, fluviatilis, and An. Christopher Liston (Dua *et al*. 2003). Morallo-Rejesus *et al*. (1990) found that Co. amboinicus oil extract resulted in 100% Ca. mortality and inhibited mature oviposition in C. chinensis. Despite the recognized effectiveness of various plant extracts with insecticidal properties, only a few plant-based products are currently in use (Javier *et al*. 2019). While multiple plants have been tested for their mosquito-killing potential at early stages, caution is advised against using non-indigenous medicinal plants due to the risk of ecosystem disruption through invasiveness upon introduction.

Sambong (*B. balsamifera*), a fragrant half-woody shrub, thrives in open fields, meadows, and waste areas at low and medium altitudes. It boasts a rich history of medicinal use in Southeast Asian countries such as China, Malaysia, Thailand, Vietnam, and the Philippines. The isolation of Sambong yields over 100 volatile and non-volatile components, including monoterpenes, sesquiterpenes, diterpenes, flavonoids, organic acids, esters, alcohols, dihydroxyflavone, and sterols. This plant exhibits a spectrum of biological and pharmacological attributes, including antioxidant, hepatoprotective, anticancer, anti-inflammatory, anti-microbial properties, as well as disease and insect resistance (Pang *et al*., 2014).

While research into the medicinal applications of Sambong essential oil is extensive, its potential as a larvicide against Ae. aegypti remains relatively unexplored. Previous studies in this area primarily investigated the larvicidal properties of the essential oil itself. This current study aims to shift the focus toward developing granules, which can be applied to identified water sources harboring Ae. aegypti larvae. The objective is to create an effective and practical method for controlling mosquito larvae in stored water bodies.

METHODOLOGY

Research Design

This study employed a quantitative experimental design to address its questions using numerical data. Specifically, a posttest-only design was used, measuring Ae. aegypti larval mortality rates after introducing Sambong (*B. balsamifera*) essential oil and granules at varying concentrations (25%, 50%, 75%, and 100%). Data was gathered through experimentation. This approach was chosen because the study's focus was to assess the larvicidal effects of Sambong granules on *Aedes aegypti*, making the experimental design and methodology suitable for observing treatment effects on larval onset and duration.

Environment

The study was conducted in the Chemistry laboratory on the 6th floor of the new building at the University of the Visayas – Main Campus, situated at Dionisio Jakosalem St., Cebu City, Philippines. The laboratory provided a controlled, clean, and noise-free environment necessary for the experiment. Adequate instructions were available to guide the researchers throughout the experimentation process. Furthermore, waste management adhered to proper protocols, segregating materials into biodegradable, non-biodegradable, and hazardous waste categories, ensuring responsible disposal throughout the research process.

Subject/s

The focal point of this study was the *Ae. aegypti* larvae, chosen as the primary subject due to their alignment with the researchers' criteria. For each test concentration, 25 batches of third or fourth-instar larvae were gathered. Ae. aegypti larvae were selected as they fulfill the criteria and are a significant source of dengue transmission on Cebu Island. This mosquito type also transmits the Zika and Chikungunya viruses, making it pertinent to the investigation. Moreover, these larvae are suitable for demonstrating the larvicidal effectiveness of Sambong (B. balsamifera) leaf formulated granules.

Collection of Sambong (*Blumea balsamifera*)

Fresh Sambong (*B. balsamifera*) leaves were gathered from a garden in Pitalo, San Fernando, Cebu. Leaves were harvested before flowering, prioritizing mature and healthy ones. Using garden shears or scissors, Sambong leaves were clipped, leaving a few sets of leaves below the top one-quarter to two-thirds of the plant. Harvesting took place after morning dew had evaporated, capitalizing on optimal flavor and essential oil concentration. The plant sample was secured in a zip-lock bag for authentication at the Department of Agriculture's MES Compound in Mandaue City, Cebu. Authentication confirmed the plant's species accuracy, resulting in an obtained certificate.

To maintain the plant sample's quality for future use, the researchers opted for traditional herb preservation through drying. Sunlight, dew, and frost can compromise herb integrity (Evans & Davis, 1998, February 28). Thus, the harvested material should be stored away from direct sunlight in a warm, dry, well-ventilated area. The researchers then discreetly transferred the dried plant material to the laboratory. For this study, over one kilogram of Sambong leaves were air-dried before extraction. The leaves were spread on a tray, covered with a cotton sheet to prevent dust or insect contamination, and dried in shade for two days with ample airflow in a room until they turned dry and brittle (Kamel, Thabet, & Algadi,

2013). Shade drying has been shown to be superior to sun drying and hot air drying in terms of preserving essential oil content and color (Thamkaew *et al*., 2020).

Preparation of the Sambong (*Blumea balsamifera*) Essential oil

Once dried, the leaves were cut into small pieces and macerated using an Erlenmeyer flask, a sealed container (Dekebo, 2019), to maintain consistency across batches and prevent menstruum evaporation during extraction (Tandon and Rane, 2008). Around 2L of ethanol was added to the Erlenmeyer flask, fully immersing the Sambong leaves, and the flask was sealed with a rubber stopper. The mixture stood at room temperature for at least 72 hours, occasionally shaken for thorough extraction (Abubukar and Haque, 2020). This agitation enhances diffusion and prevents surface accumulation, ensuring fresh menstruum contacts the particles for extraction (Tandon and Rane, 2008). The strained solution was then passed through a strainer, and the marc was pressed to recover maximum occlusion, with the residue subsequently discarded.

The essential oils from Sambong leaves were extracted using hydro-distillation, a process involving boiling plant materials or essential oils with water to generate steam. The resulting steam, or separate live steam from a steam boiler, was introduced into the distilling flask (Nasardin *et al*., 2018). The mixture was then heated, and during distillation, vapor—acetone—was condensed by indirect cooling with water as it passed through the condenser. The extracted oil was expected to collect in the distilling flask.

Preparation of Sambong (*Blumea balsamifera*) granules

The Sambong extract underwent a 48-hour evaporation process at the appropriate temperature in a hot air oven, after which it was triturated using a mortar and pestle. Researchers employed wet granulation, a method involving the addition of a liquid solution to powders, achieved by mixing dry primary powder particles with a granulating fluid (GEA, 2022).

The dehydrated Sambong extract was dissolved in water and combined with a solvent, and then blended with excipients including a binder like water-soluble polyethylene glycol, and a clarifying agent for filtration support. Following the approach of Souza *et al*. (2009), the mixture was thoroughly blended to achieve the desired consistency, strained through a sieve (no. 12-20), and dried for 2 hours in a circulating air oven. It was subsequently screened and stored.

Collection of larvae

Adult A mosquitoes were collected from a researcher's residence in Talamban, Cebu City. The specimen was then authenticated at the Mosquito Research Laboratory of the University of San Carlos - Talamban Campus, Sitio Nasipit, Cebu City. Larvae were cultured and maintained at the University of the Visayas - Main Campus.

Female Ae. aegypti mosquitoes lay eggs on container walls above the water line, which stick like glue (CDC, 2020). To collect eggs, a small bowl lined with 3" wide filter paper is placed in a mosquito cage for 48 hours. The bowl is removed, water drained, and the paper is air-dried for four days (Imam, Sofi, and Seikh, 2014). Ae. aegypti eggs can be stored in an airtight container on seed germination paper (Masters, Knapek, and Kendall, 2020). When larvae are required, the paper is submerged in distilled or dechlorinated water (WHO, 2005).

Preparation of test solutions

Different concentrations of Sambong (Blumea balsamifera) essential oil were prepared as follows: 100% (v/v) using 10 mL of pure essential oil, 75% (v/v) by diluting 7.5 mL of distilled water with 2.5 mL of essential oil, 50% (v/v) through an equal mixture of essential oil and distilled water (1:1), and 25% (v/v) by combining 2.5 mL of essential oil with 7.5 mL of distilled water.

Preparation of test organisms

Ae. aegypti larvae were reared from local residents within the researchers' Cebu City compound. The culture was maintained in a school laboratory at 27°C

with a relative humidity of 65% and 10%. Dechlorinated tap water-filled plastic enamel trays were employed to hatch mosquito eggs, and post-hatching, the larvae were provided yeast and animal pellets for nourishment. The study utilized consistent batches of third and fourth instar larvae from the reared culture.

Data recording and Gathering

The WHO standard larvicidal testing method was employed to collect crucial data for this study. The researchers assessed the larvicidal potential of Sambong essential oil and formulated granules of Sambong leaf extract by exposing test organisms to these treatments. This section outlines the experimentation process in detail. To initiate the study, the researchers obtained approval through transmittal letters addressed to the Chief Academic Officer and Dean of the College of Allied Health and Sciences (CAHS). Following approval, the experimentation phase commenced. Subsequently, the researchers collected, analyzed, and interpreted the gathered data to derive the investigation's outcomes.

Bioassay

The bioassay followed WHO guidelines, using third- and fourth-instar Ae. aegypti larvae separated by size (third: 4.3-4.6 mm, fourth: 7-7.2 mm; Bar and Andrew, 201). Initial larvicidal testing exposed larvae to Sambong essential oil at varying concentrations (25%, 50%, 75%, 100%) to determine effective levels.

For Sambong granules, 25 homogeneous Ae. aegypti larvae were placed in each disposable test cup with 90 mL water. Granule concentrations were added, with four replicates per concentration. Procedures mirrored Sambong oil testing, documenting larval mortality.

Sambong oil concentrations were compared to Abate 1SG larvicide. Granules were prepared using a method inspired by Gupta *et al*. (2013), involving drying, triturating, and granulating. Larval mortality assessment considered deceased and diseased larvae. Pupation during testing voided results if over 10%.

WHO guidelines were followed, removing underdeveloped or injured larvae. Water depth was kept at 5-10 cm to avoid excessive mortality.

Statistical Treatment Data

The study employed Two-Way Analysis of Variance (ANOVA) with repeated measurements as the statistical tool. This method assessed if significant differences exist between means of independent groups. Two-Way ANOVA with repeated measurements suits the study's objective to discern mortality rate differences in Ae. aegypti larvae between Sambong essential oil and granules. It also identifies optimal Sambong essential oil dosage for effective larvicidal impact, considering onset, duration, and concentrations. This analysis establishes connections between larvae mortality, treatment duration, timing, and concentrations.

Ethical Considerations

This study addresses issues and adheres to institutional ethics. Confidentiality is ensured, and UVIRB guidelines (Category 1) exempt this research from ethical review due to its focus on mosquito larvae and organic substances like Sambong (B. balsamifera). As no humans were involved, and precautions were taken, the methodology had minimal risk and no harm. Safety measures were followed during mosquito larvae handling and experimentation.

RESULTS AND DISCUSSION

Table 1. *The most effective concentration of Sambong (Blumea balsamifera) essential oil in terms of onset of action*

Concentration	Mean death (1st hr.)	Standard Deviation	Interpretation
25%	4.75	0.50	Slow
50%	11	0.82	Moderate-fast
75%	12.5	0.58	Moderate-fast
100%	14.5	0.58	Fast

Legend:

Onset of action (mean death at 1st hour)
Slow (4.5-7)
Moderate (8-10.25)
Moderate-fast (11.25-13.50
Fast (14.50-16.75)

Table 1 displays Sambong (B. balsamifera) essential oil concentrations and mean mortality within the first hour. Onset of action was categorized by the researchers: 25% (M=4.75, SD=0.50) as slow, 50% (M=11, SD=0.82) and 75% (M=12.5, SD=0.58) as moderate-fast, and 100% (M=14.5, SD=0.58) as fast. Results indicate 100% concentration as the most effective onset of action for Sambong essential oil.

Table 2. *The most effective concentration of Sambong (Blumea balsamifera) essential oil in terms of duration of action*

Concentration	Mean death (4th hr.)	Standard Deviation	Interpretation
25%	14	1.41	Rapid-acting
50%	17.25	0.96	Short-acting
75%	20.75	1.50	Long-acting
100%	20.75	1.71	Long-acting

Legend:
Duration of action (mean death at 4th hour)
Rapid-acting (14-15.08)
Short-acting (16.08-17.16)
Intermediate-acting (18.16-19.24)
Long -acting (20.24-21.32)

Table 2 presents Sambong (*B. balsamifera*) essential oil concentrations and mean mortality after four hours. Duration of action was categorized: 25% (M=14, SD=1.41) as rapid, 50% (M=17.25, SD=0.96) as short, and 75% (M=20.75, SD=1.50) and 100% (M=20.75, SD=1.71) as long-acting. This suggests that 75% and 100% concentrations are the most effective in terms of Sambong essential oil's duration of action.

Table 3. *Variance Analysis in the Interaction of Granules with the larvicidal properties of Sambong (Blumea balsamifera) essential oil.*

Source of Variation	***F***	***P-value***	***Decision***	***Interpretation***
Sample	0.000928	0.975754	Fail to reject Ho	Not significant

To determine whether the larvicidal activity significantly differs, a two-way ANOVA with repetition was used between Sambong (B. balsamifera) essential oil and granules. In Table 3, [F-value=0.000928] < [F-critical value=3.920124], p-value=0.975754 > α=0.05, leading to the conclusion of not rejecting Ho1. Therefore, Sambong essential oil and granules show no significant difference in larvicidal activity.

Table 4. *Variance Analysis in the difference in larvicidal activity between Abate 1SG and Sambong (Blumea balsamifera) essential oil.*

Source of Variation	***F***	***P-value***	***Decision***	***Interpretation***
Sample	3.7075617	0.056532581	Fail to reject Ho	Not significant

Comparing the larvicidal activity of Sambong (B. balsamifera) essential oil with the positive control using a two-way ANOVA with repetition. In Table 4, [F-value=3.7075617] < [F-critical value=3.92012441], p-value=0.056532581 > α=0.05, leading to the conclusion of not rejecting Ho2. Thus, no significant difference in larvicidal activity is observed between the positive control (Abate 1SG) and Sambong essential oil.

Table 5. *Variance Analysis in the larvicidal activity between Sambong (Blumea balsamifera) granules and the positive control (Abate 1SG).*

Source of Variation	***F***	***P-value***	***Decision***	***Interpretation***
Sample	3.69164	0.057057674	Fail to reject Ho	Not significant

Larvicidal activity of Sambong (*B. balsamifera*) granules was compared to the positive control using two-way ANOVA with repetition. In Table 5, [F-value=3.69164] < [F-critical value=3.92012441], p-value=0.057057674 > α=0.05, leading to the conclusion of not rejecting Ho3. Thus, no significant difference in larvicidal activity is observed between Sambong granules and the positive control (Abate 1SG).

CONCLUSION AND RECOMMENDATION

This study demonstrated that B. balsamifera granules induced larval mortality in Aedes aegypti, showing a proportional increase in mortality with higher concentrations and longer exposure times. The larvicidal effect of Sambong essential oil was evident at 100% concentration and persisted at 75% and 100% concentrations. Importantly, no significant difference in larvicidal activity was observed among Sambong essential oil, granules, and the positive control, Abate 1SG.

These findings suggest that Sambong granules exhibit comparable larvicidal effectiveness to a commercial larvicide. The use of these granules could potentially reduce the frequency of synthetic larvicide application, preventing mosquito resistance development.

In light of the summarized findings and overarching insights drawn from this study, several recommendations emerge for future exploration and investigation:

Firstly, it is suggested that forthcoming research endeavors delve deeper into the chemical composition of Sambong (B. balsamifera), focusing on the

isolation and characterization of specific compounds that exhibit potential larvicidal activity. This avenue of study could shed light on the underlying mechanisms responsible for its effectiveness against mosquito larvae.

Secondly, the scope of larvicidal assessments involving Sambong (B. balsamifera) could be broadened by considering additional mosquito species known to carry diseases, such as Anopheles and Culex. Expanding the spectrum of tested species could provide valuable insights into the broader applicability of Sambong's larvicidal properties.

Furthermore, recognizing the potential influence of environmental variables on the plant's chemical constituents, future researchers are encouraged to incorporate a comprehensive analysis of the ecological context in which Sambong specimens are sourced. This holistic approach could yield a more nuanced understanding of the plant's efficacy as a larvicide.

Lastly, innovative experimentation with diverse formulation methods for Sambong (B. balsamifera) is recommended. Exploring alternative ways to harness its larvicidal potential, beyond the granular form studied here, might yield novel delivery mechanisms that enhance its practicality and effectiveness in mosquito control strategies.

REFERENCES

A Comparison of Granulation Technologies. (2022). GEA engineering for a better world. https://www.gea.com/en/customer-cases/comparing-granulation-techniques.jsp.

Abe, R., & Ohtani, K. (2013). An ethnobotanical study of medicinal plants and traditional therapies on Batan Island, the Philippines. *Journal of Ethnopharmacology, 145*(2), 554-565. https://doi.org/10.1016/j.jep.2012.11.029

Aguilar, N.O., & Alonzo, D.S. (2016, June 19). Blumea balsamifera. PROSEA. https://uses.plantnetproject.org/e/index.php?title=Blumea_balsamifera_(PROSEA)&oldid=227

Balberona, A. N., Noveno, J. J., Angeles, M. G. B., Santos, R. I., Cachin, E. J. D. J., & Cruz, K. G. J. (2018). Ethnomedicinal plants utilized by the Ilongot-Egongot community of Bayan-ihan, Maria Aurora, Aurora, Philippines. *International Journal of Agricultural Technology*, *14*(2), 145-159. http://www.thaiscience.info/Journals/Article/IJAT/10989134.pdf

Benelli, G., Govindarajan, M., Rajeswary, M., Senthilmurugan, S., Vijayan, P., Alharbi, N. S., Kadaikunnan, S., & Khaled J. M. (2017). Larvicidal activity of Blumea eriantha essential oil and its components against six mosquito species, including Zika virus vectors: the promising potential of (4E,6Z)-allo-ocimene, carvotanacetone, and dodecyl acetate. *Parasitology Research*, *116*(4). 1175-1188. https://doi.org/10.1007/s00436-017-5395-0

Bhuiyan, M. N. I., Chowdhury, J. U., & Begum, J. (2009). Chemical components in volatile oil from Blumea balsamifera (L) DC. *Bangladesh Journal of Botany*, *38*(1). doi:10.3329/bjb. v38i1.5132

Boy, H., Rutilla, A., Santos, K., Ty, A., Yu, A., & Mahboob, T. (2018). Recommended Medicinal Plants as Source of Natural Products: A Review. *Digital Chinese Medicine*, *1*(2), 131-142. https://doi.org/10.1016/s2589-3777(19)30018-

Carvalho, E. M. de, Valverde, S. S., & Muñoz, J. A. H. (2019). Aedes aegypti: The Main Enemy of Public Health in Brazil - Challenges and Perspective for Public Health. *Malaria*. https://doi.org/10.5772/intechopen.79780

Chu, S. S., Du, S. S., & Liu, Z. L. (2013). Fumigant compounds from the essential oil of Chinese Blumea balsamifera leaves against the maize weevil (*Sitophilus zeamais*). *Journal of Chemistry*, 2013, 1-7. doi:10.1155/2013/289874

The Editors of Encyclopedia Britannica. (2023, June 1). *Dengue | Symptoms, Causes, & Treatment*. Encyclopedia Britannica. https://www.britannica.com/science/dengue.

De Guzman, A., Jamanulla, C. E. V., Sabturani, A.-S., & Madjos, G. (2020). Ethnobotany and physiological review on folkloric medicinal plants of the Visayans in Ipil and Siay, Zamboanga Sibugay, Philippines. *~ 8 ~ International Journal of Herbal Medicine*, *8*(3), 8–16. https://www.florajournal.com/archives/2020/vol8issue3/PartA/7-4-92-198.pdf

Domingo, G., & Tiongco, Y. (2019). *LARVICIDAL ACTIVITY OF SAMBONG (Blumea balsamifera L.) LEAF ESSENTIAL OIL AGAINST Aedes aegypti LARVAE*. Cas.upm.edu.ph. Retrieved from

http://cas.upm.edu.ph:8080/xmlui/bitstream/handle/123456789/837/C253.pdf?sequence=1&isAllowed=y.

Fatimah, G., Rahayu, R., & Hasmiwati. (2020). Lethal concentration (LC50, 90, and 98) and lethal time (LT50, 90, and 98) at various temephos concentrations of Aedes aegypti L. larvae. *International Journal of Mosquito Research*, *7*(1), 01–03. https://www.dipterajournal.com/pdf/2020/vol7issue1/PartA/6-6-17-434.pdf

Gupta, R., Sharma, P., Garg, A., Soni, A., Sabu, A., Rai, S., Rai, S., & Shukla, A. (2013). Formulation and evaluation of herbal effervescent granules incorporated with *Calliandra hae-matocephala* leave extract. *Indo American Journal of Pharmaceutical Research, 3*(6). https://www.academia.edu/18585220/Formulation_And_Evaluation_of_Herbal_Effervescent_Granules_Incorporated_With_Calliandra_Hematocephala_Leave_Extract

Gutierrez, P. M., Antepuesto, A. N., Eugenio, B. A. L., & Santos, M. F. (2014). Larvicidal activity of selected plant extracts against the dengue vector Aedes aegypti mosquito. *International Research Journal of Biological Sciences*, *3*(4), 23-32. https://pdfs.semanticscholar.org/396c/283b66a0ae1e9ac04c51bffec3d10ac51a06.pdf

Halimah et al. (2020). Biolarvicide of Herba Ethanol Extract of Phyllanthus niruri L on Aedes aegypti Mosquito Larva Vector of Dengue Hemorrhagic Fever Disease (DHF). https://iopscience.iop.org/article/10.1088/1742-6596/1463/1/012026/meta

Hanh, T. T. H., Hang, L. T. T., Huong Giang, V., Trung, N. Q., Thanh, N. V., Quang, T. H., & Cuong, N. X. (2021). Chemical constituents of Blumea balsamifera. *Phytochemistry Letters*, *43*, 35–39. https://doi.org/10.1016/j.phytol.2021.03.002

Jude, J., Gunathilaka, N., Udayanga, N., Fernando, D., Premarathne, P. K., Wickremasinghe, A. R., & Abeyewickreme, W. (2022). Comparative analysis of the larvicidal activity of temephos (EC50) and novaluaron (EC10) to control Anopheles stephensi in Sri Lanka. *Parasitology International*, *92*, 102686. https://doi.org/10.1016/j.parint.2022.102686

Khater, H. F., Selim, A. M., Abouelella, G. A., Abouelella, N. A., Murugan, K., Vaz, N. P., & Govindarajan, M. (2019, August 8). Commercial mosquito repellents and their safety concerns. In (Ed.), Malaria. IntechOpen. https://doi.org/10.5772/intechopen.87436

Khetarpall, N., & Khanna, I. (2016). Dengue fever: causes, complications, and vaccine strategies. *Journal of Immunology Research*, *14*. doi.org/10.1155/2016/6803098.

Kotsakiozi, P., Gloria-Soria, A., Schaffner, F., Robert, V., & Powell, J. (2018). Aedes aegypti in the Black Sea: recent introduction or ancient remnant? *Parasites &Amp; Vectors*, *11*(1). https://doi.org/10.1186/s13071-018-2933-2

Kukkar, V., Anand, V., Kataria, M., Gera, M., & Choudhury, P. (2008). Mixing and formulation of low dose drugs: underlying problems and solutions, 43-58. https://www.thaiscience.info/journals/Article/TJPS/10576401.pdf.

Liao, J., Xie, X., Wang, W., Gao, Y., Cai, Y., Peng, J., Li, T., Yi, Q., He, C., & Wang, L. (2021). Anti-inflammatory Activity of Essential Oil from Leaves of Blumea balsamifera (L.) DC through Inhibiting TLR4/NF-kB Signaling Pathways and NLRP3 Inflammasome Activation in LPS-induced RAW264.7 Macrophage Cells. *Journal of Essential Oil-Bearing Plants*, *24*(2), 160–176. https://doi.org/10.1080/0972060x.2021.1912645

Life Cycle of Aedes aegypti and Ae. albopictus mosquitoes. Centers for Disease and Control Prevention. (2020). https://www.cdc.gov/mosquitoes/about/life-cycles/aedes.html.*Life cycle: the mosquito*. Center for Disease Control and Prevention. https://www.cdc.gov/dengue/resources/factsheets/mosquitolifecyclefinal.pdf.

Liu-Helmersson, J., Brännström, Å., Sewe, M., Semenza, J., & Rocklöv, J. (2019). Estimating Past, Present, and Future Trends in the Global Distribution and Abundance of the Arbovirus Vector Aedes aegypti Under Climate Change Scenarios. *Frontiers In Public Health*, *7*. https://doi.org/10.3389/fpubh.2019.00148

Liu, B., Wang, J., Zeng, J., Zhao, L., Wang, Y., Feng, Y., & Du, R. (2021). A review of high shear wet granulation for better process understanding, control and product development. *Powder Technology*, *381*, 204–223. https://doi.org/10.1016/j.powtec.2020.11.051

Luz, T. R. S. A., de Mesquita, L. S. S., Amaral, F. M. M. do, & Coutinho, D. F. (2020). Essential oils and their chemical constituents against Aedes aegypti L. (Diptera: Culicidae) larvae. *Acta Tropica*, *212*, 105705. https://doi.org/10.1016/j.actatropica.2020.105705

Marcombe et al., (2018). Alternative insecticides for larval control of the dengue vector Aedes aegypti in Lao PDR: insecticide resistance and semi-field trial study https://parasitesandvectors.biomedcentral.com/articles/10.1186/s13071-018-3187-8

Masyudi, M., Hanafiah, M., Usman, S., & Marlina, M. (2022). Effectiveness of gel formulation of capa leaf (Blumea balsamifera L.) on wound healing in white rats. *Veterinary World*, *15*, 2059–2066. https://doi.org/10.14202/vetworld.2022.2059-2066

Mistica, M. S., Ocampo, V. R., Llagas, L. A. D. L., Bertuso, A. G., Alzona, F. D., & Magsino, E. A. (2019). A Survey of Mosquito Species in Public Schools of Metro Manila, Philippines Using Ovitraps as Surveillance Tool. *Acta Medica Philippina*, *53*(4). https://doi.org/10.47895/amp.v53i4.40

Montealegre, C. M., & De Leon R. (2016, June 28). Blumea balsamifera (Sambong) tea as a therapeutic drink for calcium oxalate stones. *MATEC Web of Conferences*, *62*(2016), 02002. https://doi.org/10.1051/matecconf/2016202002

Mosquitos. (2010). National Geographic. https://www.nationalgeographic.com/animals/inverte-brates/facts/mosquitoes.

Mosquitos and disease. (2017, March 29). Illinois Department of Public Health. http://www.idph.state.il.us/envhealth/pcmosquitoes.htm#:~:text=Without%20question%20the%20answer%20is,million%20or%20more%20every%20year.*mosquito | Description, Life Cycle, & Facts*. Encyclopedia Britannica. (2020). https://www.britannica.com/animal/mosquito-insect.

Obico, J., & Ragragio, E. (2014). A survey of plants used as repellents against hematophagous insects by the Ayta people of Porac, Pampanga province, Philippines. *Philippine Science Letters*, *7*(1), 179-186. https://philsciletters.net/2014/PSL%202014-vol07-no01-p179-186%20Obico.pdf.

Osanloo, M., Sedaghat, M. M., Sanei-Dehkordi, A., & Amani, A. (2019). Plant-Derived Essential Oils; Their Larvicidal Properties and Potential Application for Control of Mosquito-Borne Diseases. *Galen Medical Journal*, *8*, 1532. https://doi.org/10.31661/gmj.v8i0.1532

Pang, Y., Wang, D., Fan, Z., Chen, X., Yu, F., Hu, X., Wang, K., & Yuan, L. (2014, July 3). *Blumea balsamifera* – a phytochemical and pharmacological review. *Molecules, 19,* 9453- 9477. doi:10.3390/molecules19079453

Parmar, P. P., Patel, P., Vipulkumar, G., Vijay, L., & Dhiren, S. (2019). Pharmacological activities of Blumea balsamifera L.DC: an overview. *Pharma Science Monitor*, *10*(1), pp.44-56. http://www.pharmasm.com/pdf_files/20190628012016_07_pooja.pdf

Prinzi, A. (2021). *History of Yellow Fever in the U.S. | ASM.org*. ASM.org. https://asm.org/Articles/2021/May/History-of-Yellow-Fever-in-the-U-S.

Rasonabe, Z. M. P., Cruz, J. D., Tiausas, C. G., & Areza, F. (2023). Chemical composition and antimicrobial activity of the extracts and essential oil of Blumea balsamifera from the Philippines. *International Journal of Herbal Medicine*, *11*(1), 06–14. https://doi.org/10.22271/flora.2023.v11.i1a.847

R, Dr. D. (2022). Screening of phytochemical composition, Ovicidal and repellent activity of leaf extracts of Sphaeranthus indicus and Caesalpinia pulcherrima against the mosquito Culex quinquefasciatus (Diptera: Culicidae). *International Journal of Mosquito Research*, *9*(5), 01–06. https://doi.org/10.22271/23487941.2022.v9.i5a.624

Sambong. (2016). Non-Timber Forest Products – Exchange Programme. https://ntfp.org/2016/03/sambong/

Soghigian, J., Gloria-Soria, A., Robert, V., Le Goff, G., Failloux, A., & Powell, J. R. (2020). Genetic evidence for the origin of Aedes aegypti , the yellow fever mosquito, in the southwestern Indian Ocean. *Molecular Ecology*, *29*(19), 3593–3606. https://doi.org/10.1111/mec.15590

Souza, T., Gómez-Amoza, J., Pacheco, R., & Petrovick, P. (2009). Development of granules from Phyllanthus niruri spray-dried extract. *Brazilian Journal of Pharmaceutical Sciences*, *45*(4), 669-675. https://doi.org/10.1590/s1984-82502009000400009

Tan, D., Yang, Z., Zhang, Q., Ling, H., Du, Y., Lu, Y., Xie, T., Zhou, X., Qin, L., & He, Y. (2020). Simultaneous Quantitative Determination of Polyphenolic Compounds in *Blumea balsamifera* (Ai-Na-Xiang, Sembung) by High-Performance Liquid Chromatography with Photodiode Array Detector. *International Journal of Analytical Chemistry*, *2020*, 1–9. https://doi.org/10.1155/2020/9731327

V, S., I, M., & Laija, L. (2021). Larvicidal efficacy of Hyptis capitata Jacq. Against Culex quinquefasciatus mosquito (Culicidae). *International Journal of Mosquito Research*, *8*(4), 42–46. https://www.dipterajournal.com/pdf/2021/vol8issue4/PartA/8-4-10-166.pdf

Wang, Y.H., Tian, H.Y., He, S.J., Hu, Q.P., Wang, H.X., Zhou, C.L., & Wang, X. (2012). Analysis of volatile components from leaf in Blumea balsamifera (L.) DC. with different extraction methods by gas chromatography–mass spectrometry. *Sci. Tech. Food Ind., 33*, 97–105.

Widhiantara, I. G., & Jawi, I. M. (2021). Phytochemical composition and health properties of Sembung plant (Blumea balsamifera): A review. *Veterinary World*, *14*(5), 1185–1196. https://doi.org/10.14202/vetworld.2021.1185-1196World Health Organization. (2005). Guidelines for laboratory and field testing of mosquito

WHO (World Health Organization) on behalf of the Special Programme for Research and Training in Tropical Diseases, Scientific Working Group. Report on Dengue. Switzerland: 2007.

Zhu, L., & Tian, Y. (2011). Chemical composition and larvicidal activity of *Blumea densifora* essential oils against *Anopheles anthropophagus*: a malarial vector mosquito. *Parasitology Research, 109*(5), 1417-1422. doi:10.1007/s00436-011-23

Moral Distress and Professional Autonomy Among Staff Nurses in Private Hospitals

Jeah Frey T. Magbanua
Rosenie S. Coronado

Graduate School of Nursing, College of Allied Health Sciences
University of the Visayas

ABSTRACT

To optimize nurses' roles, it is essential to minimize moral distress and maximize professional autonomy. However, limited local studies explore the correlation between moral distress and professional autonomy among nurses. This research in Midsayap, Cotabato for Q1 2023 utilized a quantitative approach, revealing that most nurses were young adults (19-35 years old), predominantly female, with a bachelor's degree, and employed in private hospitals. Moral distress was low, and professional autonomy varied. No significant relationships were found between demographic factors and moral distress or professional autonomy. Despite moral distress, high professional autonomy can be achieved, and the two are not significantly related. An autonomy enhancement plan was developed to address the study's findings.

Keywords: Descriptive, Correlational Design; Moral Distress; Nurses; and Professional Autonomy

INTRODUCTION

Moral distress in nursing refers to the suffering affecting one's intellect, body, and interpersonal connections at work, arising from a conflict between personal beliefs and actions. It occurs when a person knows the right course of action but is unable to carry it out due to institutional policies and professional autonomy. Studies indicate that 80 percent of nurses experience moderate to severe moral distress (Abdolmaleki *et al*., 2018). This distress is a significant factor leading nurses to leave their positions and, in some cases, the profession entirely.

It can negatively impact a nurse's ability to care for patients and may require an extended period for resolution.

Nurses faced various challenges during the COVID-19 pandemic, including work-related stress, long hours due to a shortage of staff, limited resources, strained relationships with patients and families, and concerns about patient and nurse safety. Additionally, making decisions on care provision and other work-related pressures contribute to moral distress among nurses. This moral distress can lead to burnout, self-esteem loss, professional disappointment, reduced job satisfaction, and, in some cases, nurses leaving their careers (Godshall, 2021).

Professional autonomy involves the ability to make independent decisions and act in alignment with one's professional knowledge. It is crucial in rapidly evolving healthcare situations to define and elevate the nursing profession. Globally, there is concern about how fundamental nursing components are managed in the context of expanding specialized nursing roles (Skar, 2010).

Reducing nurses' autonomy can hinder their ability to apply personal and professional moral reasoning, leading to moral distress, especially during a pandemic. In Samar Island, Philippines, nurses with greater autonomy show excellent performance, job satisfaction, and commitment. Organizational initiatives, such as sufficient assistance, policies, and training, are crucial for fostering autonomy (Labrague et al., 2018). This study focuses on exploring the relationship between autonomy and moral distress among nurses in private hospitals, aiming to enhance professional values and prevent vulnerabilities. Staff nurses often face moral distress and challenges in professional autonomy related to patient care and unit operation decisions. The research, conducted by a former staff nurse and current clinical instructor, hopes to contribute valuable insights for both academic and clinical settings, fostering positive outcomes and resolving workplace conflicts.

The study, conducted in the Municipality of Midsayap, Cotabato for the 2nd quarter of 2023, aimed to assess moral distress and professional autonomy among nurses in private hospitals. It addressed specific questions regarding the profile of nurses in terms of age, sex, highest educational attainment, and number of years in the nursing profession. The study also explored moral distress concerning time, resources, and relationships, as well as professional autonomy in patient care and unit operation decisions. Additionally, it investigated the significant relationships between profile factors and both moral distress and professional autonomy. The goal was to propose a nursing service enhancement plan based on the study's findings.

METHODOGOLY

Research Design

This quantitative research utilized a descriptive, correlational research design to provide a "snapshot" of the frequency and characteristics of the profile, moral distress, and professional autonomy of nurses in private hospitals in the Municipality of Midsayap, Cotabato during the 2nd quarter of 2023 (Ihudiebube-Splendor & Chikeme, 2020). The descriptive design was employed to analyze the respondents' age, sex, highest educational attainment, number of years in the nursing profession, and the type of institution. It was also used to assess moral distress and professional autonomy. The correlational design examined the interrelationship between the profile, moral distress, and professional autonomy of the nurses.

Environment

The study was conducted in Midsayap, a first-class municipality in the Province of Cotabato, situated in the northwest section of the province. Midsayap serves as a major commercial and trading center, experiencing recent industrial development. The municipality has one public and five private healthcare facilities with varying classifications, including secondary and tertiary hospitals, each with

different bed capacities, managed by either the Provincial Government of Cotabato or private entities.

Respondents

This study involved staff nurses from three private hospitals in Midsayap Municipality. The estimated total population of respondents included 51 from Community Health Service Cooperative Hospital (a private Level II hospital), 29 from Midsayap Doctors Specialist Hospital Incorporated (a private Level II hospital), and 22 from Anecito P. Pesante Sr. Memorial Hospital Incorporated (a private Level II hospital). In total, 102 staff nurses participated in the study.

Sampling Design, Inclusion and Exclusion Criteria

Sampling for this study involved a complete enumeration, including all staff nurses from selected hospitals regardless of their area of assignment. Inclusion criteria required respondents to be of legal age, employed as staff nurses in a private hospital in Midsayap, North Cotabato, and willing to provide voluntary consent. Excluded from the study were Nurse Managers, Departmental head nurses, individuals with potential COVID-19 exposure or symptoms, and staff nurses with less than six months in service who did not actively participate during the pandemic surge.

Instrument

The study employed a three-part questionnaire. Part one focused on the respondents' profile, covering age, sex, highest educational attainment, years of experience, and the type of institution. Part two consisted of a moral distress questionnaire adapted from Eizenberg et al. (2009). This 11-item questionnaire used a six-point Likert scale, assessing three factors: 'relationships,' 'resources,' and 'time.' Internal consistency for each factor exceeded 0.79. Mean scores categorized distress levels from extremely low to extremely high. Part three utilized the Blegen et al. (1993) scale, adopted from Mrayyan (2005), employing a five-point Likert scale for 42 self-reported items related to patient care and unit operations. The

Cronbach's alpha values for each subscale were .88 and .94, respectively. Interpretation categorized scores as very low to very high.

Data Gathering Procedure

The research process began with the submission of three research titles for approval. Once a title was approved, an adviser was assigned, and further approvals were sought from the Dean of the College of Allied Health Sciences, the Chief Academic Officer, and the Chief of Hospitals. The study underwent a Design hearing for expert panel approval. Following this, approval was obtained from the University of the Visayas-Research Ethics Committee (UV-REC). The researcher awaited the release of the notice to proceed before recruiting the first respondent, ensuring adherence to Inter-agency Task Force (IATF) guidelines during in-person data collection for the safety of both respondents and the researcher. An enumerator was hired to assist in distributing and retrieving research questionnaires. In data collection, inclusion and exclusion criteria guided respondent selection, and the enumerator was briefed on these criteria for recruitment. Questionnaires were distributed and collected on the same day, checked for completeness, and any missing or unanswered items were addressed with the respondents. All completed questionnaires were collected, compiled, and subjected to descriptive and inferential statistical analysis. At the study's conclusion, the completed questionnaires were shredded, while a soft copy of tabulated responses was retained for reference and deleted after the study.

Statistical Treatment Data

The study employed the following statistical methods: Frequency Distribution and Simple Percentage for presenting the respondents' profile; Mean Score for assessing moral distress and professional autonomy; Chi-Square for evaluating the significant relationship between profile and moral distress, as well as profile and professional autonomy; Cramer's V for determining the strength of association in significant relationships identified by Chi-Square; and Pearson r for

examining the significant relationship between moral distress and professional autonomy among nurses.

Ethical Considerations

The study strictly adhered to the ethical guidelines set forth by the University of the Visayas' research ethics committee, ensuring the integrity of this research.

RESULTS AND DISCUSSION

Profile of the Nurses

The majority of nurses in the study were young adults, aged 19 to 35, aligning with Erik Erikson's psychosocial development theory. Millennial nurses (under 35) comprised 65% of the workforce, while those over 60 were less than 5%. In terms of gender, nursing remains female-dominated, with over 75% being women. Despite societal changes, nursing has retained its female majority. Regarding education, most nurses held a bachelor's degree, a requirement for licensure. Few had master's or doctorate degrees. The age of respondents in a related study averaged 30.62 years, with the majority holding degrees in nursing. In terms of experience, there was a roughly equal distribution among those with 1-5, 6-10, and 11-15 years of service. Very few had 16-20 years or more, indicating a potential turnover issue. This aligns with findings showing most nurses having served for more than 15 years in a related study.

Moral Distress among Nurses

Table 1 shows that in terms of time, nurses rated it low, expressing moderate belief that they lacked time for patient care. They admitted to keeping patients waiting and providing insufficient attention due to time constraints. This indicates a broader issue of nurses being overwhelmed by a higher patient load, causing rushed and compassion-lacking care, leading to moral distress.

Studies, like Bradley (2023), highlight that a shortage of nurses directly impacts patient care quality. Patient mortality increases with fewer nurses,

emphasizing the importance of maintaining an appropriate nurse-patient ratio. Shortages lead to ER overcrowding, prolonged waiting times, and increased likelihood of medical errors, including medication mistakes.

The dimension of resources was also rated low. Nurses believed they were compelled to respond inadequately due to resource shortages. Lack of privacy and patient referrals to other wards due to overcrowding reflect the strain on resources. This scarcity is attributed to an insufficient allocation of funding, worsened by experiences like the COVID-19 pandemic.

Regarding relationships, nurses rated it low, feeling compelled to follow orders against their conscience, sometimes disregarding patient and family inquiries. Collaboration and teamwork with doctors were noted as essential, emphasizing the need for nurses to assert themselves as patient advocates, stay updated on healthcare trends, and maintain competence.

Overall, low ratings in time, resources, and relationships signify low moral distress. However, the nurses still experience moral distress, highlighting the need for hospital administrators to address root causes by ensuring adequate nurse-patient ratios, allocating financial resources, and promoting professional autonomy among nurses.

Table 1. *Moral Distress among Staff Nurses*

Statements	Mean score	SD	Interpretation
Time			
1. I do not have enough time to provide the patient with the care she/he deserves	3.52	2.29	To a moderate extent
2. I was forced to keep a patient, who needed a treatment, waiting, due to lack of time	3.22	2.28	To some extent
3. I did not give the patient a sufficient attention due to lack of time	3.20	2.22	To some extent
Factor mean	3.31	2.11	Low

Resources			
1. I pondered whether to tell the patient (who did not have the means) that he can purchase an expensive medication not included in the ‘‘medication basket’’	3.21	2.22	To some extent
2. I was forced to invade the patient’s privacy due to inadequate conditions (e.g., a patient in a corridor)	3.10	2.31	To some extent
3. I was obliged to respond to the patient, who deserved a treatment but did not get it	3.56	2.17	To a moderate extent
4. I was forced to move a patient to an unsuitable department instead of providing her/him an appropriate treatment in my department	3.25	2.37	To some extent
Factor mean	3.28	2.04	Low
Relationships			
1. I was forced to treat the patient according to the physician’s directions against my conscience	2.92	2.21	To some extent
2. I pondered what to do while witnessing deficient treatment provided by another nurse or a physician	3.45	2.07	To some extent
3. I was forced to ignore the patient’s questions because the physician was supposed to address them	2.70	2.02	To some extent
4. I was forced to ignore the patient’s family questions because the physician was supposed to address them	2.78	2.05	To some extent
Factor mean	2.96	1.83	Low
Grand mean	3.18	1.81	Low

Note: *n=102.*

Legend: 1.00 – 1.83 is extremely low, 1.84 – 2.66 is very low, 2.67 – 3.49 is low, 3.50 – 4.32 is high, 4.33 - 5.15 is very high, and 5.16 - 6.00 is extremely high.

Professional Autonomy among Nurses

Table 2 shows that in patient care decisions, nurses rated their autonomy as high. They perceived full independent authority and accountability in areas such as serving as patient advocates, preventing skin breakdown, teaching self-care

activities, and preventing patient falls. They also felt empowered to refuse physician's orders, advance PRN orders, and inform patients of surgery risks. Additionally, they believed in sharing authority and accountability when questioning physician orders, discussing alternatives, and deciding on the timing of care.

Consistent with this, Shohani *et al*. (2018) found high levels of professional autonomy among nurses, especially in patient care decisions. Similarly, Alruwaili and Abuadas (2023) reported moderate overall work autonomy, with more autonomy in patient care decisions compared to unit operation decisions.

Concerning unit operation decisions, nurses rated their autonomy as moderate. They expressed involvement in group decisions related to department committees, delivery of care methods, and unit goals. Nurses shared authority and accountability in tasks such as arranging trading hours, making patient assignments, and developing unit procedures. This autonomy extended to areas like developing and revising unit policies, initiating research activities, and planning yearly budgets.

Labrague *et al*. (2018) also highlighted a moderate degree of professional autonomy among Filipino nurses, emphasizing the positive impact on job outcomes. This suggests that while nurses have a high level of autonomy in patient care decisions, they operate within a collaborative and interdisciplinary healthcare setting, demonstrating both dependent and interdependent functions.

In summary, nurses possess high professional autonomy in patient care decisions, showcasing their independence within the nursing profession. However, their role is intricately connected to collaborative healthcare practices.

Table 2. *Professional Autonomy among Staff Nurses*

Statements	Mean score	SD	Interpretation
Patient Care Decisions			
1. Serve as patient advocate	4.23	1.01	have full independent authority and accountability
2. Question physician orders	3.59	1.25	consult with others and participate in-group decisions
3. Teach about patient medication	4.12	1.08	consult with others and participate in-group decisions
4. Consult with MD and other professionals	4.09	0.96	consult with others and participate in-group decisions
5. Prevent skin breakdown	4.26	0.99	have full independent authority and accountability
6. Teach self-care activities	4.33	1.01	have full independent authority and accountability
7. Discuss alternatives with physician	3.48	1.11	consult with others and participate in-group decisions
8. Prevent patient falls	4.55	0.82	have full independent authority and accountability
9. Teach heath care promotion activities	4.31	0.96	have full independent authority and accountability
10. Refuse to carry out physician's orders	2.81	1.53	share authority and accountability with others
11. Decide time to administer care	3.55	1.45	consult with others and participate in-group decisions
12. Plan care with patient	4.13	1.02	consult with others and participate in-group decisions
13. Advance PRN orders	2.76	1.56	share authority and accountability with others
14. Refer to other healthcare professionals	3.56	1.10	consult with others and participate in-group decisions
15. Make decision for pain management	3.41	1.23	consult with others and participate in-group decisions
16. Handle individual patient's complaints	3.93	1.05	consult with others and participate in-group decisions
17. Develop patient education material	3.83	1.15	consult with others and participate in-group decisions
18. Handle physician complaints	3.71	1.17	consult with others and participate in-group decisions

19. Inform patient of surgery risks	3.01	1.42	share authority and accountability with others
20. Order diagnostic test	2.31	1.45	assume authority and accountability when asked
21. Determine day of discharge	2.49	1.49	assume authority and accountability when asked
Factor mean	3.64	0.58	High
Unit Operation Decisions			
1. Arrange for trading hours	3.08	1.35	share authority and accountability with others
2. Decide own break and lunch time	2.99	1.45	share authority and accountability with others
3. Make patient assignments	3.16	1.36	share authority and accountability with others
4. Serve on department committees	3.57	1.16	consult with others and participate in-group decisions
5. Present unit in service	3.66	1.17	consult with others and participate in-group decisions
6.Determine delivery of care method	3.93	1.12	consult with others and participate in-group decisions
7. Implement new ideas	3.71	1.10	consult with others and participate in-group decisions
8. Schedule own hours	2.63	1.39	share authority and accountability with others
9. Develop unit goals	3.61	1.08	consult with others and participate in-group decisions
10 Develop and revise unit procedures	3.19	1.20	share authority and accountability with others
11. Develop and revise standards of care	3.20	1.28	share authority and accountability with others
12. Develop and revise unit policies	3.18	1.29	share authority and accountability with others
13. Initiate research activities	3.19	1.20	share authority and accountability with others
14. Determine quality assurance indicators	3.29	1.26	share authority and accountability with others
15. Choose new equipment and supplies	3.07	1.42	share authority and accountability with others
16. Determine staff meeting agendas	3.25	1.27	share authority and accountability with others

17. Develop peer review evaluation	3.25	1.26	share authority and accountability with others
18. Staff nurse job description	3.26	1.39	share authority and accountability with others
19. Interview and select new staff	2.80	1.46	share authority and accountability with others
20. Identify causes for unit budget variance	2.66	1.44	share authority and accountability with others
21. Plan yearly unit budget	2.63	1.52	share authority and accountability with others
Factor mean	3.20	0.81	Moderate
Grand mean	3.42	0.63	High

Note: *n=102.*
Legend: 1.00 – 1.80 is very low, 1.81 – 2.60 is low, 2,61 – 3.40 is moderate, 3.41 – 4.20 is high, and 4.21 - 5.00 is very high.

Relationship between Profile and Moral Distress

The correlation between the profile variables (age, sex, highest educational attainment, and number of years in the profession) and the dimension of time, resources, relationships, and overall moral distress were examined as shown in Table 3. For time and resources, the p values were greater than .05, indicating a lack of significant correlation. Therefore, age, sex, educational attainment, and years in the profession were not significantly associated with time and resources of moral distress. This suggests that nurses, regardless of their profiles, face similar time and resource challenges but adapt to cope with the demands of patient care.

However, regarding relationships, the number of years in the profession showed a significant correlation, with a positive relationship indicating that longer tenure led to higher moral distress in relationships. This is consistent with findings suggesting that prolonged service exposes nurses to diverse cases and changes, potentially straining relationships, especially with new colleagues.

Conversely, age, sex, and highest educational attainment were not significantly correlated with relationships of moral distress. This implies that, irrespective of these profile factors, nurses may experience similar levels of distress

in interpersonal relationships. Similarly, overall moral distress was not significantly correlated with age, sex, highest educational attainment, or number of years in the profession. This indicates that moral distress is not influenced by these profile factors. Nurses, regardless of their profiles, encounter moral distress, but their knowledge and coping mechanisms, developed during education and exposure to real cases, contribute to their ability to manage and adapt to challenges in patient care.

Contrasting findings from other studies highlight the complexity of moral distress and its various influencing factors. While some studies associate moral distress with factors like work experience, team communication, powerlessness, staffing, and provision of care, the current study does not find significant correlations with the specified profile variables. Different contexts, settings, and methodologies might contribute to these discrepancies. In conclusion, despite the lack of direct correlation between certain profile factors and moral distress, it's crucial for healthcare management to address various contributing factors to alleviate moral distress among nurses.

Table 3. *Relationship between Profile and Moral Distress*

Moral Distress (dependent variable)	chi value	*p* value	Cramer's V value	Decision	Interpretation
Time					
Age	17.691	.409	--	Failed to reject Ho	Not significant
Sex	20.852	.233	--	Failed to reject Ho	Not significant
Highest educational attainment	46.016	.671	--	Failed to reject Ho	Not significant
Number of years in the profession	62.907	.652	--	Failed to reject Ho	Not significant
Resources					

Age	21.200	.508	--	Failed to reject Ho	Not significant
Sex	24.161	.339	--	Failed to reject Ho	Not significant
Highest educational attainment	43.812	.984	--	Failed to reject Ho	Not significant
Number of years in the profession	86.120	.537	--	Failed to reject Ho	Not significant
Relationships					
Age	29.352	.106	--	Failed to reject Ho	Not significant
Sex	29.646	.099	--	Failed to reject Ho	Not significant
Highest educational attainment	78.815	.086	--	Failed to reject Ho	Not significant
Number of years in the profession	1.118E2	.023	.524	Reject Ho	Significant
Overall Moral Distress					
Age	47.258	.842	--	Failed to reject Ho	Not significant
Sex	67.598	.182	--	Failed to reject Ho	Not significant
Highest educational attainment	1.961E2	.120	--	Failed to reject Ho	Not significant
Number of years in the profession	2.265E2	.590	--	Failed to reject Ho	Not significant

Legend: Significant if *p* value is < .05. Type of institution was not correlated since there is only one group. To interpret Cramer's V, a value of 0.1 - 0.3 is weak association, 0.4 - 0.5 is medium association, and > 0.5 is strong association.

Relationship between Profile and Professional Autonomy

The correlation analysis as shown in Table 4 indicates that the p values between profile variables (age, sex, highest educational attainment, and number of

years in the profession) and professional autonomy were not significant (greater than .05). Consequently, the null hypothesis was not rejected, suggesting no significant correlation between these profile factors and professional autonomy. This implies that professional autonomy is not influenced by age, sex, educational attainment, or years in the profession. Regardless of these profile aspects, nurses can achieve a high level of professional autonomy.

Professional autonomy is an integral part of the nursing profession, instilled in nurses during their education and carried throughout their careers. This understanding persists regardless of age, sex, educational attainment, or years in the profession. Nurses recognize the autonomous nature of their practice, as evidenced by their membership in accredited professional organizations, symbolizing the autonomy of the nursing profession. In contrast, Rababa *et al*. (2022) found that nurses, according to gender, experience, and nursing home type, had low perceived control over nursing practice. This study provides insights into how nurses' sociodemographic and professional characteristics may impact their perceived control over nursing practice.

Another study by Gharaaghahi *et al*. (2022) indicated that ICU nurses demonstrated moderate autonomy and job stress, with autonomy showing a positive correlation with work experience in the ICU. The findings suggest the need for strategies to enhance nurses' autonomy and address factors contributing to job stress in the ICU. In conclusion, fostering professional autonomy in nursing is essential, as it contributes significantly to patient care. Management should actively support and promote autonomy within the nursing profession, recognizing its vital role in patient care.

Table 4. *Relationship between Profile and Professional Autonomy*

Professional autonomy (dependent variable)	chi value	*p* value	Cramer's V value	Decision	Interpretation
Age	74.970	.144	--	Failed to reject Ho	Not significant
Sex	66.779	.349	--	Failed to reject Ho	Not significant
Highest educational attainment	1.595E2	.942	--	Failed to reject Ho	Not significant
Number of years in the profession	2.638E2	.293	--	Failed to reject Ho	Not significant

Legend: Significant if *p* value is < .05. Type of institution was not correlated since there is only one group. To interpret Cramer's V, a value of 0.1 - 0.3 is weak association, 0.4 - 0.5 is medium association, and > 0.5 is strong association.

Relationship between Moral Distress and Professional Autonomy

Table 5 indicates that the p values for the correlation between moral distress dimensions, overall moral distress, and patient care decisions were greater than .05, suggesting a lack of significant correlation. Consequently, the null hypothesis was not rejected, indicating that patient care decisions are not significantly influenced by time, resources, relationships, or overall moral distress among nurses. High levels of these factors do not necessarily hinder achieving high patient care decisions. Similarly, the analysis for unit operation decisions showed p values greater than .05, leading to the conclusion that unit operation decisions are not significantly correlated with time, resources, relationships, or overall moral distress. Despite high levels of these variables, achieving high unit operation decisions is still possible.

Furthermore, the correlation between moral distress dimensions, overall moral distress, and overall professional autonomy had p values greater than .05.

The null hypothesis was not rejected, signifying that professional autonomy is not significantly influenced by moral distress. Therefore, a high level of professional autonomy can be attained despite high moral distress among nurses. Contrary to these findings, other studies have reported a positive relationship between professional autonomy and moral distress. However, this study suggests that moral distress is not a contributing factor to professional autonomy. Nurses' moral distress may be seen as part of the challenges and frustrations in nursing practice, common to the entire healthcare team.

Additional studies also reported an inverse relationship between professional autonomy and moral distress, emphasizing the importance of autonomy in reducing moral distress. However, the current study implies that improving these variables independently is crucial, as moral distress does not directly impact professional autonomy.

Table 5. *Relationship between Moral Distress and Professional Autonomy*

Variables	r value	*p* value	Decision	Interpretation
Patient Care Decision				
Time	-.116	.245	Failed to reject Ho	Not significant
Resources	-.125	.210	Failed to reject Ho	Not significant
Relationship	-.100	.317	Failed to reject Ho	Not significant
Overall Moral Distress	-.126	.207	Failed to reject Ho	Not significant
Unit Operation Decisions				
Time	-.140	.160	Failed to reject Ho	Not significant
Resources	-.151	.130	Failed to reject Ho	Not significant
Relationship	-.104	.299	Failed to reject Ho	Not significant

Overall Moral Distress	-.147	.142	Failed to reject Ho	Not significant
Overall Professional Autonomy				
Time	-.144	.149	Failed to reject Ho	Not significant
Resources	-.155	.120	Failed to reject Ho	Not significant
Relationship	-.114	.255	Failed to reject Ho	Not significant
Overall Moral Distress	-.153	.125	Failed to reject Ho	Not significant

Legend: Significant if *p* value is < .05. Pearson r value interpretation: -1 perfectly negative, -0.8 strongly negative, -0.5 moderately negative, -0.2 weakly negative, 0 – no association, 0.2 weakly positive, 0.5 moderately positive, 0.8 strongly positive, and 1 perfectly positive.

CONCLUSION AND RECOMMENDATION

In conclusion, the study finds that age, sex, highest educational attainment, and number of years in the profession do not significantly influence moral distress and professional autonomy among nurses. The results indicate that nurses can experience low moral distress and high professional autonomy irrespective of these demographic factors. Furthermore, professional autonomy is not significantly correlated with moral distress, suggesting that nurses can maintain a high level of professional autonomy even in the face of elevated moral distress. The study aligns with the Theory of Moral Reckoning, attributing nurses' moral distress to challenges in time, resources, and relationships during patient care. Additionally, the Self-Determination Theory's emphasis on autonomy is reflected in the study's findings. A professional autonomy enhancement plan has been proposed based on the results. Recommendations include presenting the findings to hospitals for potential adoption, utilizing the study as a reference for policy development, incorporating the results into educational discussions, and disseminating the study through research congresses and publications. The study suggests potential research avenues such as comparative analyses on moral distress and professional autonomy

among nurses in different settings and exploring the phenomenology behind professional autonomy.

REFERENCES

Abbaszadeh, A., Nakhaei, N., Borhani, F., Roshanzadeh, M. (2013). The relationship between moral distress and retention in nurses in Birjand teaching hospitals. *Iranian Journal of Medical Ethics and History of Medicine, 6*, 57–66.

Abdolmaleki, M., Lakdizaji, S., Ghahramanian, A., Allahbakhshian, A., & Behshid, M. (2019). Relationship between autonomy and moral distress in emergency nurses. *Indian Journal of Medical Ethics, 4*(1), 20-25. https://doi.org/10.20529/IJME.2018.076.

Aiken, L. H., Clarke, S. P., Sloane, D. M., Sochalski, J., & Silber, J. H. (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *Journal of American Medical Association, 288*(16), 1987–93.

AllahBakhshian, M., Alimohammadi, N., Taleghani, F., Nik, A. Y., Abbasi, S., & Gholizadeh, L. (2017). Barriers to intensive care unit nurses' autonomy in Iran: A qualitative study. *Nursing Outlook, 65*, 392–9.

Barrett-Landau, S., & Henle, S. (2014). Men in nursing: Their influence in a female dominated career. *Journal of Leadership Instruction, 13*(2), 10–13.

Bayanzay, K., Amoozgar, B., Kaushal, V., Holman, A., Som, V., & Sen, S. (2022). Impact of profession and wards on moral distress in a community hospital. *Nursing ethics*, *29*(2), 356–363. https://doi.org/10.1177/09697330211015349

Berhie, A. Y., Tezera, Z. B., & Azagew, A. W. (2020). Moral Distress and Its Associated Factors Among Nurses in Northwest Amhara Regional State Referral Hospitals, Northwest Ethiopia. *Psychological Research on Behavior and Management, 13*, 161-167. https://doi.org/10.2147/PRBM.S234446.

Borhani, F., Abbaszadeh, A., Nakhaee, N., & Roshanzadeh, M. (2014). The relationship between moral distress, professional stress, and intent to stay in the nursing profession. *Journal of Medical Ethics and History of Medicine, 7*, 3.

Brazil, K., Kassalainen, S., Ploeg, J., & Marshall, D. (2010). Moral distress experienced by health care professionals who provide home-based palliative care. *Social Science & Medicine, 71*(9), 1687-91.

Butts, J., & Rich, K. (2008). *Nursing ethics: Across the curriculum and into practice.* Jones & Bartlett Learning.

Cavaliere T.A., Daly B., Dowling D., Montgomery K. Moral distress in neonatal intensive care unit RNs. *Advanced Neon Care, 10,* 145–156.

Corley, M., Minick, P., Elswick, R. K., & Jacobs, M. (2005). Nurse moral distress and ethical work environment. *Nursing Ethics, 12*(4), 381–90.

Cummings, C. L. (2009). *The effect of moral distress on nursing retention in the acute care setting.* University of North Florida.

Davis, A. J., Fowler, M., Fantus, S., Fins, j., Joy, M., Kruse, K., Burgart, A., Lindsey, M., Mooney-Doyle, K., Uritsky, T., & Grady, C. (2018). *Healthcare professional narratives on moral distress: Disciplinary perspectives*. In: Moral Distress in the health professions. Springer, 21–57.

De Veer, A. J., Francke, A. L., Struijs, A., & Willems, D. L. (2013). Determinants of moral
distress in daily nursing practice: a cross-sectional correlational questionnaire survey. *International Journal of Nursing Studies, 50*, 100–108.

DeVellis, R. F. (1991). Scale development: Theory and applications. Sage.

Didier, A., Dzemaili, S., Perrenoud, B., Campbell, J., Gachoud, D., Serex, M., Staffoni- Donadini, L., Franco, L., Benaroyo, L., & Maya, Z.-S. (2020). Patients' perspectives on interprofessional collaboration between health care professionals during hospitalization: A qualitative systematic review.

JBI Evidence and Synthesis, 18, 1208–1270. https://doi.org/10.11124/JBISRIR-D-19-00121.

Eizenberg, M. M., Desivilya, H. S., & Hirschfeld, M. J. (2009). Moral distress questionnaire for clinical nurses: Instrument development. *Journal of Advanced Nursing, 65*(4), 885–892. https://doi.org/10.1111/j.1365-2648.2008.04945.x.

French, K. (2020). *We are all green: Stereotypes for female soldiers and veterans*. [Dissertation Type, Unpublished]. University of Texas.

Gharaaghaji, A. R., Roghaie, T., Naser, P., & Madine, J. (2022). The relationship between professional autonomy and job stress among intensive care unit nurses: A descriptive correlational study. *Iranian Journal of Nursing and Midwifery Research, 27*(2), 119-124.

Godshall, M. (2021). Coping with moral distress during COVID-19. *Nursing, 51*(2), 55- 58. https://doi.org/10.1097/01.NURSE.0000731840.43661.99.

Hamric, A. B., & Blackhall, L. J. (2007). Nurse-physician perspectives on the care of dying patients in intensive care units: Collaboration, moral distress, and ethical climate. *Critical Care Medicine, 35*(2), 422-29.

Hardingham, L. B. (2004). Integrity and moral residue: Nurses as participants in a moral community. *Nursing Philosophy, 5*(2), 127-34.

Harrowing, J. N., & Mill, J. (2010). Moral distress among Ugandan nurses providing HIV care: A critical ethnography. *International Journal of Nursing Studies, 47*(6), 723–731. https://doi.org/10.1016/j.ijnurstu.2009.11.010.

House, S., & Havens, D. (2017). Nurses' and physicians' perceptions of nurse-physician collaboration: A systematic review. *International Journal of Nursing Science and Journal of Nursing Administration, 47*, 165–171. https://doi.org/10.1097/NNA.0000000000000460.

Kim, Y., Oh, Y., Lee, E., Kim, S. J. (2022). Impact of nurse-physician collaboration, moral distress, and professional autonomy on job satisfaction among nurses acting as physician assistants. *International Journal of*

Environmental Research and Public Health, 19(2), 661. https://doi.org/10.3390/ijerph19020661.

Kramer, M., Maguire, P., & Schmalenberg, C. E. (2006). Excellence through evidence: The what, when, and where of clinical autonomy. *Journal of Nursing Administration, 36*(10), 479–491.

Kuwano, N., Fukuda, H., & Murashima, S. (2016). Factors affecting professional autonomy of Japanese nurses caring for culturally and linguistically diverse patients in a hospital setting in Japan. *Journal of Transcultural Nursing, 27*, 567–73.

Labrague, L. J., McEnroe-Petitte, D. M., & Tsaras, K. (2018). Predictors and outcomes of nurse professional autonomy: A cross-sectional study. *International Journal of Nursing Practice, 25*(1), e12711. https://doi.org/10.1111/ijn.12711

Maximiano Faraco, M., Lima Gelbcke, F., Brehmer, L. C. de F., Ramos, F. R. S., & Ghizoni Schneider, D. (2022). Moral distress-associated sociodemographic and occupational aspects in nursing managers at federal university hospitals. *Revista Da Escola De Enfermagem Da USP*, *56*, e20210447. https://doi.org/10.1590/1980-220X-REEUSP-2021-0447en

McAndrew, N. S., Leske, J., & Schroeter, K. (2018). Moral distress in critical care nursing: The state of the science. *Nursing Ethics, 25*, 552–570.

McCaffree, D. (2006). Moral distress and the intensive care unit. *Critical Care Medicine, 34*(12), 3049-50.

Mobley, W. H. (1977). Intermediate linkages in the relationship between job satisfaction and employee turnover. *Journal of Applied Psychology, 62*(2), 237-40.

Molazem, Z., Bagheri, L., & Najafi Kalyani, M. (2022). Evaluation of the moral distress intensity and its relationship with the quality of work life among nurses working in oncology wards in Shiraz, Southwest of Iran. *Biomedical Research International, 2022*, 7977039. https://doi.org/10.1155/2022/7977039.

Morley, G., Grady, C., McCarthy, J., & Ulrich, C. M. (2020). Covid-19: Ethical challenges for nurses. *Hastings Center Report, 50*(3), 35-39. https://doi.org/10.1002/hast.1110.

Morley, G., Ives, J., Bradbury-Jones, C., & Irvine, F. (2019). What is 'moral distress'? A narrative synthesis of the literature. *Nursing Ethics, 26*(3), 646–662. https://doi.org/10.1177/0969733017724354.

Moshtagh, M., & Mohsenpour, M. (2019). Moral distress situations in nursing care. *Clinical Ethics, 14*, 141–145.

Mrayyan, M. (2005). American nurses' work autonomy on patient care and unit operations. *British Journal of Nursing, 14*, 962-7. https://doi.org/10.12968/bjon.2005.14.18.19881.

Nathaniel, A. K. (2006). Moral reckoning in nursing. *Western Journal of Nursing Research, 28*(4), 419-38.

Nouri, A., Jouybari, L., & Sanagoo, A. (2017). Nurses' perception of factors influencing professional autonomy in nursing: A qualitative study. *The Journal of Urmia University of Medical Science, 28*, 469–77.

Ohnsorge, K., Keller, H. R. G., Widdershoven, G. A., Rehmann-Sutter C. (2012). 'Ambivalence'at the end of life How to understand patients' wishes ethically. *Nursing Ethics, 19*, 629–641.

Oshodi, T., Bruneau, B., Crockett, R., Kinchington, F., Nayar, S., & West, E. (2019). Registered nurses' perceptions and experiences of autonomy: A descriptive phenomenological study. *BMC Nursing, 18*, 51. https://doi.org/10.1186/s12912-019-0378-3

Paganini, M. C., & Bousso, R. S. (2015). Nurses' autonomy in end-of-life situations in intensive care units. *Nursing Ethics, 22*, 803–14.

Papathanassoglou, E. D. E., Karanikola, M. N., Kalafati, M., Giannakopoulou, M., Lemonidou, C., & Albarran, J. W. (2012). Professional autonomy,

collaboration with physicians, and moral distress among European intensive care nurses. *American Journal of Critical Care, 21*(2), e41-e52.

Pauly, B. M., Varcoe, C., & Storch, J. (2012). Framing the issues: moral distress in health care. *HEC Forum, 24*(1), 1–11.

Pauly, B., Varcoe, C., Storch, J., & Newton, L. (2009). Registered nurses' perceptions of moral distress and ethical climate. *Nursing Ethics, 16*(5), 561–73.

Pires, B. S. M., Oliveira, L. Z. F., Siqueira, C. L., Feldman, L. B., Oliveira, R. A., & Gasparino, R. C. (2018). Nurse work environment: comparison between private and public hospitals. *Einstein (Sao Paulo). 16*(4), eAO4322. https://doi.org/10.31744/einstein_journal/2018AO4322.

Radoc-Samson, M. J. (2022). The association between moral distress and job satisfaction of Filipino nurses in the Philippines and Saudi Arabia. *International Journal of Medical Research & Health Sciences, 11*(6).

Rao, A. D., Kumar, A., & McHugh, M. (2017). Better nurse autonomy decreases the odds of 30-day mortality and failure to rescue. *Journal of Nursing Scholarship, 49*, 73–9.

Rautanen, A., Baffoe-Mensah, F., & Zeh, H. (2018). *Sources of moral distress among registered nurses.*

Rouhi-Balasi, L., Elahi, N., Ebadi, A., Jahani, S., & Hazrati, M. (2020). Professional autonomy of nurses: A qualitative meta-synthesis study. *Iranian Journal of Nursing and Midwifery Research, 25*(4), 273-281. https://doi.org/10.4103/ijnmr.IJNMR_213_19.

Ruelens-Trinkaus, D. (2017). *The meaning and experiences of professional autonomy in novice registered nurses.* Widener University.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68-78.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. The Guilford Press.

Sambuu Ganchuluun, Akiko Kondo, Megumi Ukuda, Hiroki Hirai, Jieru Wen, "Factors Related to Nurses' Professional Autonomy When Caring for Patients with COVID-19 in a University Hospital: A Cross-Sectional Study", *Journal of Nursing Management*, vol. 2023, Article ID 1741721, 13 pages, 2023. https://doi.org/10.1155/2023/1741721

Sarkoohijabalbarezi, Z., Ghodousi, A., & Davaridolatabadi, E. (2017). The relationship between professional autonomy and moral distress among nurses working in children's units and pediatric intensive care wards. *International Journal of Nursing Science, 4*(2), 117-121. https://doi.org/ 10.1016/j.ijnss.2017.01.007.

Setoodegan, E., Gholamzadeh, S., Rakhshan, M., & Peiravi, H. (2019). Nurses' lived experiences of professional autonomy in Iran. *International Journal of Nursing Sciences, 6*(3), 315-321. https://doi.org/10.1016/j.ijnss.2019.05.002.

Shohani, M., Rasouli, M., & sahebi, A. (2018). The level of professional autonomy in Iranian nurses. *Journal of Clinical and Diagnostic Research, 12*(5), LC01-LC04. https://doi.org/ 10.7860/JCDR/2018/31249.11465.

Shoorideh, F. A., Ashktorab, T., Yaghmaei, F., & Alavi Majd, H. (2015). Relationship between ICU nurses' moral distress with burnout and anticipated turnover. *Nursing ethics*, *22*(1), 64–76. https://doi.org/10.1177/0969733014534874

Showalter, B. L., Malecha, A., Cesario, S., & Clutter, P. (2022). Moral distress in clinical research nurses. *Nursing Ethics, 29*(7-8), 1697-1708. https://doi.org/10.1177/09697330221090613.

Skår R. (2010). The meaning of autonomy in nursing practice. *Journal of clinical nursing*, *19*(15-16), 2226–2234. https://doi.org/10.1111/j.1365-2702.2009.02804.x

Smith, S. (2003). A concept analysis of professional autonomy: A correctional nursing perspective. *Journal of Correctional Health Care, 10*, 35–45.

St Ledger, U., Begley, A., Reid, J., Prior, L., McAuley, D., & Blackwood, B. (2013), Moral distress in end-of-life care in the intensive care unit. *Journal of Advanced Nursing, 69*(8), 1869-80.

Statistic Stats (2020). *Male nursing statistics 2019.* https://www.statisticstats.com/health/male-nursing-statistics/.

Stievano, A., De Marinis, M. G., Russo, M. T., Rocco, G., & Alvaro, R. (2012). Professional dignity in nursing in clinical and community workplaces. *Nursing Ethics, 19*(3), 341-356.

Suvalova, T. V., Panin, V. I., & Chamberlain, O. O. (2020). *Career opportunities policy in Russia.* International Scientific Conference "Far East Con" (ISCFEC 2020). Atlantis Press.

Taghinejad, H., Suhrabi, Z., & Kikhavani, S. (2013). Concept analysis of autonomy in nursing: A review study. *Scientific Journal of Ilam University of Medical Science, 21*, 37–43.

Tahmasebi, S., Ashktorab, T., Ebadi, A., & Alavi-Majd, H. (2013). Professional socialization in clinical nurses: A phenomenological study. *Journal of Clinical Nursing and Midwifery, 2*, 39–52.

Valizadeh, L., Zamanzadeh, V., & Shohani, M. (2013). Challenges of autonomy in nursing: An integrative review. *Quarterly Journal of Nursing Management, 2*, 9–17.

Valizadeh, S., Khoshknab, M. F., Mohammadi, E., Ebrahimi, H., & Bostanabad, M. A. (2015). Nurse's perception from barriers to empowerment: A qualitative research. *Journal of Urmia Nursing and Midwifery Faculty, 12*, 1128–38.

Varcoe, C., Pauly, B., Webster, G., & Storch, J. (2012a). Moral distress: Tensions as springboards for action. *HEC Forum, 24*(1), 51-62.

Varcoe, C., Pauly, B., Storch, J., Newton, L., & Makaroff, K. (2012b). Nurses' perceptions of and responses to morally distressing situations. *Nursing Ethics, 9*(4), 488-500.

Varjus, S.-L., Leino-Kilpi, H., & Suominen, T. (2011). Professional autonomy of nurses in hospital settings—A review of the literature. *Scandinavian Journal of Caring Sciences, 25*, 201–207. https://doi.org/10.1111/j.1471-6712.2010.00819.x

Virani, S. B. (2021). Moral distress amid COVID-19: A frontline emergency nurse's perspective. *Nursing, 51*(12), 39-43. https://doi.org/10.1097/01.NURSE.0000800072.35132.c1.

Watkins, C., Hart, P. L., & Mareno, N. (2016). The effect of preceptor role effectiveness on newly licensed registered nurses' perceived psychological empowerment and professional autonomy. *Nurse Education in Practise, 17*, 36–42. https://doi.org/10.1016/j.nepr.2016.02.003

Xiaoyan, W., Yufang, Z., Lifeng, C., & Congcong, S. (2018). Moral distress and its influencing factors: a cross-sectional study in China. *Nursing Ethics, 25*, 470–480.

Yeganeh, M. R., Pouralizadeh, M., & Ghanbari, A. (2019). The relationship between professional autonomy and moral distress in ICU nurses of Guilan University of Medical Sciences in 2017. *NPT, 6*(3), 133-141.

Perception and Adaptation to Online Learning During Covid-19 Pandemic Among Nursing Students

Janen Marie Aurena
Ghilman Baybayan
Cinder Marie Beliña
Euhanne Christian Cueva
Shainna Mae Dagohoy
Nichelle Gargantos
John Charles Gerasmio
John Rayven Manayon
Kristelle Marie Omega
Donna Jay Sebua
Steven Gregory Tanquion
Edward Cacanog
Yvonne Sevilla

Department of Nursing, College of Allied Health Sciences, University of the Visayas

ABSTRACT

The COVID-19 pandemic significantly impacted the education system worldwide, leading to the implementation of various alternative learning methods, including online platforms. This research aimed to assess nursing students' perception and adaptation to online learning at the University of the Visayas during the pandemic. The study utilized a quantitative approach, collecting data through a questionnaire from 200 nursing students, mainly residing in Cebu City. Results indicated a high level of adaptability and positive attitude towards online learning, but challenges were observed in virtual laboratories. The researchers recommend further exploration of signal strength and student-instructor interaction to address potential miscommunication issues.

Keywords: *Perception, Adaptation, Online Learning, Covid19 Pandemic*

INTRODUCTION

The pandemic has impacted the Philippines, including Cebu City, which implemented community quarantine measures, including canceling face-to-face

education. Online learning methods were adopted to continue education during this time. The new normal has led to various adaptations, such as work-from-home, blended learning, and face mask mandates. The adaptation to online learning remains a significant challenge for students of all ages. (Rappler, 2020; Corpuz, 2021).

The COVID-19 pandemic led to widespread closures of educational institutions worldwide, impacting 94 percent of students in over 190 countries (UN, 2020). To continue education, institutions swiftly transitioned to online learning. This approach, using electronic equipment and information technologies, was relatively new to the educational system in the Philippines (Xhelili et al., 2020).

Due to the pandemic, universities adopted online learning, leading to a rapid increase in online enrollments. While online education offers adaptability and flexibility, some students struggle with the changes. Research from Unaizah College of Medicine and Medical Sciences in Saudi Arabia highlights the effectiveness of online instructional methods but also notes challenges due to limited nonverbal communication, student-professor interactions, material accessibility, and time management (Khalil, Mansour, et al., 2020).

Effective time management is crucial for online students to achieve their learning objectives and remain focused without the structure of traditional classes. Those with strong time management skills are better prepared for online learning and feel confident in managing their studies. However, some students may struggle with time management, leading to difficulties in logging in regularly and meeting deadlines.

The quality of students' online experiences can be influenced by the support provided, and guided interactions can help them develop skills and positive attitudes towards online education. Clinical Instructors play a vital role in supporting students' engagement with technologies through guided interactions.

The pandemic's impact on students globally is a concerning issue that needs attention, especially for individuals of varying economic statuses. Understanding and considering each person's perception is essential in finding ways to mitigate the pandemic's effects on students.

This study aims to explore the adaptability and perception of nursing students towards online learning. Nursing is a field that heavily relies on face-to-face interaction and clinical skills, which have been challenging to practice during the pandemic. Understanding the impact of online learning on nursing students is crucial for enhancing their practical skills and medical insights. While many studies have focused on general students' online learning experiences, this research specifically focuses on the adaptation issues faced by nursing students at the University of the Visayas. Nurses play a vital role in current times, and their education in practical knowledge is affected by the pandemic's limitations, making them a key focus of this research.

The study was conducted to determine the level of adaptability and perception of nursing students regarding their insights and experiences taking online classes. The outcome of this study could be used by the university to gain knowledge of different coping techniques and ways to adapt more easily and effectively under different circumstances.

This study guaranteed the perception and adaptation of nursing students to online learning, revealing how comfortable and confident they were in the knowledge gained during online education. The results of this study were essential to the students, faculty, and university administrators as it served as a tool or guide for future purposes.

METHODOLOGY

Design

The study that was implemented used a quantitative research design, specifically the descriptive correlational method. This approach involves collecting

and analyzing numerical data to discover patterns, averages, test causal relationships, and make predictions that can be generalized to larger populations (Bhandari, 2021). The total population of nursing students at the University of the Visayas served as respondents for this study, and descriptive correlations were used to examine the relationship between the level of adaptation, perception, and online education among variables to determine whether independent variables influenced the existence of dependent variables.

In this study, the descriptive aspect was applied to gather and analyze the respondents' profile, including gender, age, year level, address, internet connection, and gadgets. Additionally, the level of adaptation and perception towards online learning during the ongoing pandemic was examined. Correlations were used to investigate relationships between nursing students, their adaptation, and perception of online learning.

Research Environment

The University of the Visayas (UV) fosters a sustainable research culture, harnessing the talents of its stakeholders and promoting cultural, environmental, spiritual, and societal responsibility. Through this commitment, the University equips students, faculty, and staff with research capabilities, promoting scholarly research in both academic and non-academic fields. The institution emphasizes the development of principled professionals who are mindful of time constraints, and it aims to provide functional learning experiences aligned with industry needs and community services.

Respondents

The study included 200 nursing students from the University of the Visayas out of a total of 338 students. The participants were from different year levels: 77 from the first year, 77 from the second year, 40 from the third year, and 6 from the fourth year. The retrieval rate was 59.17 percent due to some students refusing to respond to the survey. The survey was conducted during the first semester of the

academic year 2021-2022, with the respondents completing a questionnaire provided to them online through Google Forms.

Complete enumeration was used, meaning all 338 nursing students were required to participate in the survey. Inclusion criteria involved being currently enrolled nursing students at the University of the Visayas, while students without a stable internet connection were excluded since the survey was conducted online. The gathered data was utilized to improve teaching and learning models, strengthen support systems, enhance communication, and inform staff professional development.

Data Gathering Procedure

Due to refusal from the school administration to conduct face-to-face surveys due to Covid-19 health and safety concerns, the researchers used Google Forms for their survey. They sent a transmittal letter to the Dean of the College of Allied Health Sciences at the University of the Visayas, requesting access to the master list of all nursing students from 1st to 4th year. After obtaining consent, the researchers approached each class beadle of each year level and requested access to their group chat link. Informed consent was then disseminated to eligible participants through Facebook messenger, along with the purpose of the study and the questionnaire via Google Forms.

To comply with health protocols during the pandemic, the data was collected through an online questionnaire generated on Google Forms. The survey took approximately 5 minutes and was completed at the participants' preferred time. The questionnaire had two sections: the first section covered demographic and academic features, including level of studies, age, year level, and home study infrastructure (gadgets). The second section focused on students' opinions on online learning, including how the Covid-19 epidemic influenced their learning experiences, performance, and expectations. The third and fourth sections addressed the significant relationship between the level of adaptation and

perception to online learning among nursing students and their profile. The final section of the questionnaire asked students to propose an online learning enhancement plan.

Instruments

The researcher used the TASHP questionnaire to assess medication compliance among the target respondents and identify influencing factors (Pan et al., 2019). The questionnaire comprised a scale from one to five, with each point representing a response: (1) Never, (2) rarely, (3) sometimes, (4) mostly, and (5) all the time. The total scores obtained ranged from 25 to 125, with higher scores indicating better compliance. A cut-off score of 109 was used to differentiate satisfactory from low compliance behavior (Pan et al., 2019).

The Questionnaire consists of 25 questions divided into 4 categories. Category 1 assesses compliance with doctor's prescriptions regarding dose, frequency, and type of medicine (5 items). Category 2 evaluates "poor medication behavior" through 8 items. Categories 3 (10 items) and 4 (2 items) determine the willingness of individuals to undertake lifestyle modifications. Category 4 specifically focuses on alcohol and tobacco control with 2 items. These categories help determine the factors influencing medication compliance.

Statistical Treatment of Data

The researchers employed the method of Total Enumeration to determine the perception and adaptation of nursing students towards online learning. This method involves measuring all members of the whole population, which, in this study, were the nursing students of the University of the Visayas.

Mean was used to evaluate the average value of each item in the results, and the total mean values of "Perception" and "Adaptation" were calculated and compared to draw a conclusion.

Standard Deviation was also calculated by the researchers, along with the mean, to aid in arriving at a conclusion. This was used for all data under "Perception" and "Adaptation."

Percentage was utilized to identify the quantity of particular students in the demographic data and set boundaries between different opposing circumstances. Age, gender, year level, residence, and gadget were presented in the form of percentages.

Pearson Correlation Coefficient was used to determine if there is a correlation or association between "Perception" and "Adaptation."

Ethical Consideration

Ethical considerations are of paramount importance in human participant studies. The researchers followed fundamental ethical guidelines set by the university to ensure the study's ethical soundness.

RESULTS AND DISCUSSION

Table 1. *Demographic Characteristics*

Demographic profile	Number of students	Percentage (%)
Age		
Younger than 20	47	23.5%
20-24	129	64.5%
25-29	14	7%
30-34	4	2%
35-39	5	2.5%
40 and older	1	0.5%
Total	200	100%
Sex		
Male	48	24%
Female	152	76%
Total	200	100%
Residence		
Cebu City	91	46.4%
Cebu Province	96	49%
Outside Cebu	9	4.6%
No response	4	2%

Total	200	100%
Year level		
Level 1	77	38.5%
Level 2	77	38.5%
Level 3	46	20%
Level 4	6	3%
Total	200	100%
Gadget		
Cellphone	123	62.1%
Cellphone and computer	34	17.2%
Computer	31	15.7%
Computer and iPad	4	2%
iPad	2	1%
Cellphone and iPad	3	1.5%
Tablet	1	0.50%
No response	1	1%
Total	200	100%

Table 1 indicates that the highest percentage of respondents falls within the age bracket of 20-24 years old, which aligns with the typical age range of college students. Notably, these younger age groups, particularly those aged 20-24 and below, are significantly impacted by the pandemic, rendering them eligible respondents for the survey. Conversely, respondents aged 30 and above are fewer, likely due to many having already completed their education or pursued advanced degrees.

The predominance of female respondents reflects the historical trend in nursing education, largely influenced by Florence Nightingale's leadership. Despite comprising a smaller portion (24%) of the survey respondents, male participants ensure the survey results remain unbiased, as both genders are equally affected by the pandemic.

The higher representation of level 1 and level 2 nursing students is expected, considering these levels have the largest student population in the University of the Visayas Nursing Department. Conversely, level 4 students have the lowest

representation, likely due to some discontinuing their studies due to financial constraints. Comparatively, level 1 and 2 students, who have experienced online learning throughout their nursing journey, provide valid insights into online learning perceptions.

Most respondents hail from Cebu City and Cebu province, where the pandemic has necessitated a shift to online learning. This validates their perceptions, given their firsthand experience with online education. Additionally, since the University of the Visayas is located in Cebu City, the majority of students reside there, while those outside Cebu face their own challenges with distance learning.

The prevalence of respondents relying solely on cellphones for online learning (61.5%) suggests ongoing financial challenges. However, this doesn't hinder their participation, as mobile phones offer software for online learning. While computers are more convenient, a comparable portion of respondents use them. Regardless of the device used, the commitment to continuing education amidst challenges underscores their successful adaptation to online learning.

Table 2. *Level of Perception*

Statement	Mean	SD	Interpretation
PQ1. The use of technology is difficult for learning purposes.	2.46	.68	Agree
PQ2. On campus traditional learning increases students' engagement compared to online classes.	1.72	.66	Strongly Agree
PQ3. Virtual laboratories have the same effectiveness as laboratories developed in university.	3.03	.88	Disagree
PQ4. Technology brings large benefits to education.	1.89	.69	Agree
PQ5.Technology enables a good cooperation between students.	2.30	.83	Agree

PQ6. Online learning is a positive experience despite coming as a result of the pandemic.	2.03	.74	Agree
General WM= 2.24			

Table 2 indicates that nursing students at the University of the Visayas generally perceive online learning positively, with a General Weighted Mean of 2.24, categorized as "Good." This suggests that most students view online learning as an effective tool for continuing education during the pandemic. Among the statements in Table 3, five yielded a "Good" interpretation, indicating a high level of agreement from respondents. Statement number 2, interpreted as "Very Good," underscores the overwhelmingly positive perception of online learning among students. Despite being a response to a negative circumstance, the strong positive perceptions from nursing students highlight their resilience and adaptability.

The notable contrast between the five "Good" results and the one "Poor" result reflects the overwhelmingly positive mindset of the majority of respondents toward online learning. The third statement from Table 3, interpreted as "Poor," warrants attention. A considerable number of respondents strongly disagree that virtual laboratories are as effective as university-developed laboratories, emphasizing the irreplaceable value of hands-on learning in nursing education. Research by Hannay and Newvine (2006) supports the positive perception of online learning among students, indicating a preference for distance education due to its flexibility and perceived educational quality. In conclusion, the majority of nursing students exhibit a positive perception of online learning, which can lead to positive outcomes due to the influence of mindset on behavior and results.

Table 3. *Level of Adaptation*

Statement	Mean	SD	Interpretation
AQ1. I have adapted easily to online learning.	2.32	.76	Agree
AQ2. The learning process is more effortless to understand in online class	2.49	.76	Agree
AQ3. I have changed my method of learning.	2.18	.74	Agree
AQ4. I have difficulty in accessing and processing course materials because of technology devices	2.29	.86	Agree
AQ5. I feel tired of learning via technology devices for a long time.	2.05	.83	Agree
AQ6. Online exams cause me more anxiety than examinations in the classroom.	2.43	.82	Agree
AQ7. Online learning has a positive impact on my academic performance	2.30	.86	Agree
AQ8. I will achieve my academic goals through online learning.	2.53	.96	Disagree
AQ9. My technology skills have improved during online learning.	1.87	.63	Agree
AQ10. I have reduced the use of internet for entertainment.	2.54	.83	Disagree
AQ11. Have you adapted the new education system which is through online?	2.13	.77	Agree
AQ12. Do you have the conductive environment at home for online learning?	2.27	.80	Agree
General WM= 2.28			

The General Weighted Mean of 2.28, interpreted as "Good," suggests that nursing students at the University of the Visayas have a generally positive level of adaptation to online learning. This result mirrors the General Weighted Mean of

"Perception," indicating a correlation between perception and adaptation, where perception influences adaptation.

While the majority of items are labeled as "Good," the two items labeled as "Poor" provide insight into areas of challenge. Despite the inherent difficulties of online learning, most students are thriving in their adaptation process, driven either by necessity or motivation amid the pandemic.

The two items labeled as "Poor" warrant attention to identify areas for improvement in online learning. Statement number 8, "I will achieve my academic goals through online learning," reflects respondents' doubts about online learning's efficacy in fulfilling their academic aspirations.

Research by Flett (2020) suggests that students who feel a sense of belonging and importance are better able to adapt to online learning during the pandemic. Adaptability, defined as the ability to adjust effectively to novel and uncertain circumstances, plays a key role in students' adaptation to online learning. In conclusion, while the majority of students exhibit good adaptation skills to online learning, addressing areas of poor adaptation is crucial for enhancing the overall online learning experience.

Table 4. *Significant Relationship*

Variables	*Computed r*	*p*-value	Interpretation	Decision
Level of Adaptation and Perception	0.6052	<.00001	Significant at $p<.05$	Reject the null hypothesis

Legend: Significant $p<.05$

The researchers rejected the null hypothesis based on the findings presented in Table 4, indicating a significant relationship between the level of adaptation and perception to online learning among nursing students.

Perception, as the independent variable, influences the dependent variable of adaptation. A student's perception forms the foundation for how they adapt to

the online learning environment. Positive perceptions, such as excitement or engagement with online learning, facilitate easier adaptation, while negative perceptions, such as boredom or skepticism, may hinder effective adaptation.

A positive perception of online learning is essential for developing adaptation skills. Without a positive mindset, students may struggle to adapt to online learning. Therefore, fostering a positive perception among students is crucial for ensuring a successful online learning experience and promoting high levels of adaptation.

CONCLUSION AND RECOMMENDATION

In conclusion, the level of adaptation is directly influenced by the level of perception. A higher perception correlates with a higher level of adaptation. The majority of respondents indicated a successful transition to online learning, which is a positive outcome. This result is understandable considering the differences between online and face-to-face learning environments, which require different approaches due to varying contexts and resources. Activities and their subjects are interdependent, with the attributes of subjects and objects influencing each other. This finding aligns with Activity theory, which helps to connect individual subjects with social reality by illustrating the reciprocal relationship between activities and their context.

Further research is warranted to conduct a comprehensive study over an extended period and encompassing a broader spectrum of respondent categories. Nursing students are encouraged to participate actively and honestly in surveys, dedicating a small portion of their time to provide truthful responses without hesitation. Additionally, there is a need to explore in greater detail how the relationship between adaptation to online learning during the COVID-19 pandemic among nursing students influences their future educational pursuits and professional affiliations. Furthermore, it is essential to delve deeper into issues surrounding signal strength and the distance between students and teachers, as these

factors may contribute to miscommunication and hinder effective online learning experiences.

REFERENCES

Abbasi, S., Ayoob, T., Malik, A., &Memon, S. I. (2020). Perceptions of Students Regarding E-learning During Covid-19 at a Private Medical College.*Pakistan Journal of Medical Sciences, 36(COVID19 S4).*https://doi.org/10.12669/pjms.36.covid19-s4.2766

Abuhammad, S. (2020).Barriers to Distance Learning During the COVID-19 Outbrea: A QualitativeReviewFromParents'Perspective.Heliyon.https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7654229/

Adedoyin, O.B. &Soykan, E. (2020).Covid-19 Pandemic and Online Learning Challenges and Opportunities.Interactive Learning Environments, 1-13. https://www.tandfonline.com/doi/full/10.1080/10494820.2020.1813180

Adnan, M. (2020). Online learning amid the COVID-19 pandemic: Students perspectives. *Journal of Pedagogical Research, 1(2), 45–51.*https://doi.org/10.33902/jpsp.2020261309

Agormeda *et al*. (2020).Student's Awareness of Online Learning and Platforms.Research Gate.https://www.researchgate.net/figure/StudentsAwareness-of-Online-Learning-and-Platforms-n467_tbl2_345730461

Ainoutdinova, I. N., Khuziakhmetov, A. N. &Tregubova, T. M. (2017). Advantages and disadvantages of distance education for university students in Russia.*Modern Journal of Language Teaching Methods, 7(9/2), 72–86.*

Almahasees Z, Mohsen K and Amin MO (2021) Faculty's and Students' Perceptions of Online Learning During COVID-19. Front. Educ.6:638470. https://doi.org/10.3389/feduc.2021.638470

Ana, I. D., Agus, C., Suryatmojo, H., Widyatmanti, W., Aluicius, I. E., Kusumawardani, S. S., Mustofa, Ushada, M., Nurhayati, R. T., Kurniawan, A., Prijambada, I. D., &Kusumandari, A. (2021). Innovative and

Sustainable Research-Based Learning & Community Services During Lockdown by COVID-19. In W. Leal Filho (Ed.), COVID-19: Paving the Way for a More Sustainable World (pp. 257–279). Springer International Publishing.https://doi.org/10.1007/978-3-030-69284-1_13

Aragon, S.R. & Johnson, E.S. (2008). Factors Influencing Completion and Non completion of Community College Online Courses.Am. J. Dist. Educ. 22, 146158.
https://www.tandfonline.com/doi/abs/10.1080/08923640802239962

Aucensillo, J. (2021). *Embracing The New Normal Education Amid COVID-19 Health Crisis.*Philippines Information Agency.https://pia.gov.ph/features/2021/11/11/embracing-new-normaleducation-amid-covid-19-health-crisis

Bao, W. (2020). COVID-19 and Online Teaching in Higher Education: A Case Study of Peking University. Human Behavior and Emerging Technologies, 2(2), 113–115.https://doi.org/10.1002/hbe2.191

Barbour, M. K., LaBonte, R., Hodges, C., Moore, S., Lockee, B. B., Trust, T., Bond, M. A., Hill, P., & Kelly, K. (2020). Understanding pandemic pedagogy: Differences Between Emergency Remote, Remote, and Online Teaching [Report]. https://vtechworks.lib.vt.edu/handle/10919/101905

Bhandari, P. (2021). An introduction to quantitative research.Scribbr. https://www.scribbr.com/methodology/quantitative-research/

Bozkurt, A., & Sharma, R.C. (2020). Emergency Remote Teaching In a Time of Global Crisis Due To Corona Virus Pandemic. *Asian Journal of Distance Education*, *15(1).https://doi.org/10.5281/zenodo.3778083*

Childers, L. (2018). Online Versus Traditional Nursing Education. Minority Nurse.

Ciccarelli, D. (2022). Online Learning vs. Traditional Learning: Considerations for Educators and Students Voices. https://www.voices.com/blog/online-learningvs-traditional-learning/

Deasy (2020). *Adapting To Online Learning During The CoronaVirusPandemic.* Kiron.https://kiron.ngo/community/adapting-to-online-learningduring-the-coronavirus-pandemic/

Ertmer, P.A. (1999). Addressing First and Second Order Barriers To Change: Strategies for Technology Integration.Educational Technology Research Development, 47(4), 47-6.

Flett, G (2020). *Scholarship of Teaching and Learning In Psychology.* American Psychological

Association.https://www.yorku.ca/research/category/news/2020/10/studyfinds-promoting-adaptability-key-to-student-success-with-online-learning/

Halim, M. S. A. A., Hashim, H., &Yunus, M. M. (2020). Pupils' Motivation and Perceptions on ESL Lessons through Online Quiz-Games.*Journal of Education and E-Learning Research, 7(3), 229–234.*

Hannay, M. &Newvine, T. (2006). *Perceptions of Online Learning : A Comparison of Online and Traditional Learning.*Journal of Online LearningandTeaching.olt.merlot.org/documents/MS05011.pdf&ved=2ahUKEwjiienpl8j6AhV5UGwGHeq0CFoQFnoECAgQBQ&usg=AOvVaw2PrB6XahhcnbfKe2ACm6J4

Imber Black, E. (2020). Rituals In the Time of Covid-19 : Imagination, Responsiveness and the Human Spirit.Family

Islam, T. &Habib, T. (2022). Barriers of Adopting Online Learning Among the University Students in Bangladesh During Covid-19. *Indonesian Journal On Learning Advance Education.*

https://www.researchgate.net/publication/357449176_Barriers_of_Adopting_Online_Learning_Among_the_University_Students_in_Bangladesh_During_C ovid-19

Jallad, S. T., &Işık, B. (2021). Transitioning Nursing Students' Education from Traditional Classroom to Online Education during the COVID-19 Pandemic: A Case Study Applied to the Meleis Trial. *Florence Nightingale journal of nursing*, *29(1), 124–127*.https://doi.org/10.5152/FNJN.2021.20090

Khalil, R. (2020). The sudden transition to synchronized online learning during the COVID-19 pandemic in Saudi Arabia: A qualitative study exploring medical students' perspectives - BMC Medical Education.BioMed

Centralhttps://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-020-

Mathivanan, S.K., Jayagopal, P., Prasad, G., et al. (2021). Adoption of E-Learning During Lockdown in India.*International Journal of System Assurance*

Muthuprasad, E., Aiswarya, S., Aditya, K.S., et al. (2021). Students' Perception and Preference for Online Education in India During COVID-19 Pandemic.Social Sciences and Humanities

Neuhauser, C. (2002). Learning Style and Effectiveness of Online and Face-to-face Instruction. *American Journal of Distance*

Omda S. E., Sergent, S. (2021) In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan.2021 Aug 23. https://pubmed.ncbi.nlm.nih.gov/34662088/

Oztok, M., Zingaro, D., Brett, C. & Hewitt, J. (2013). Exploring Asynchronous and Synchronous Tool Use in Online Courses.Computer education 60, 87-

Pokhrel, S. &Chhetri, R. (2021).A Literature Review On Impact of COVID-19 Pandemic On Teaching and Learning. Higher Education For the Future, pp. 133-141. https://journals.sagepub.com/doi/10.1177/2347631120983481

Powers, K. L., Brooks, P. J., Galazyn, M., & Donnelly, S. (2016). Testing the Efficacy of MyPsychLab to Replace Traditional Instruction in a Hybrid Course. Psychology Learning & Teaching, 15(1) https://doi.org/10.1177/1475725716636514

Rana, S., Garbuja, C., &Rai, G. (2021). Nursing Students' Perception of Online Learning Amidst COVID-19 Pandemic. *Journal of Lumbini Medical College, 9(1), 6 pages.*https://doi.org/10.22502/jlmc.v9i1.408

Shapiro, H., Lee, C., Wyman Roth, N. et al. (2017). *Understanding the Massive Open Online Course Student Experience.*Computers and Education 110, 35-50.

Sheme, K., Ibrahimi, E., Rruci, E., et al. (2020). Adaptation and Perception of Online Learning during COVID-19 Pandemic

byAlbanianUniversityStudents.Research Gate.https://www.researchgate.net/publication/342658111_Adaptation_and_P erception_of_Online_Learning_during_COVID19_Pandemic_by_Albanian_U niversity_Students

Simamora, R. M. (2020). The Challenges of online learning during the COVID-19 pandemic: An essay analysis of performing arts education students. Studies in Learning and Teaching, 1(2), 86–103.

Song, L., Singleton, E.S., Hill, J.R. &Koh, M.H. (2004). Improving online learning: Student perceptions of useful and challenging characteristics. Internet and Higher Education, 7(1), 59-70. Elsevier Ltd. Retrieved February 25, 2022 https://www.learntechlib.org/p/102596/

Sykes L. M., Gani, F., Vally, Z. (2016) Statistical terms Part 1: The meaning of the MEAN, and other statistical terms commonly used in medical research United Nations Sustainable Development Group. (2020). Policy Brief: Education during COVID-19 and beyond. https://unsdg.un.org/resources/policy-briefeducation-during-covid-19-and-beyond

Wilczewski, M., Gorbaniuk, O. &Giuri, P. (2021).The Psychological and Academic Effects of Studying From The Home and Host Country During the Covid-19 Pandemic.Brief Research Report.https://www.frontiersin.org/articles/10.3389/fpsyg.2021.644096/full

Xhelili, P., Ibrahimi, E., Rruci, E., &Sheme, K. (2021). Adaptation and perception of online learning during COVID-19 pandemic by Albanian university students.*International Journal on Studies in Education (IJonSE), 3(2), 103111.* https://scholar.archive.org/work/s7ofk4j57ra6fpvg26d24idioy/access/wayback/ https://ijonse.net/index.php/ijonse/article/download/49/pdf

Yee, R. C. S. (2013). Perceptions of Online Learning in an Australian University: Malaysian Students' Perspectives – Usability of the Online Learning Tools. *International Journal of Asian Social Science, 3(9), 1973–1981.*

Zhu, X., Chen, B., Avadhanam, R. M., Shui, H., & Zhang, R. Z. (2020). Reading and connecting: Using Social Annotation in Online Classes. Information and Learning Sciences, 121(5/6), 261–271. https://doi.org/10.1108/ILS-04-2020-

Development of Antibacterial Ointment from *Psidium guajava* Leaf Extract Against *Staphylococcus Aureus*

Earl Ester Colonia
Aubrey Mae Dantes
Justine Kyle De Asis
Sundus Musse
Mary Grace Noya
Serene Desiree Sacramento

Department of Pharmacy, College of Allied Health Sciences, University of the Visayas

ABSTRACT

*Psidium guajava leaf extract shows promise for pharmaceutical innovation. This study evaluates its effectiveness against Staphylococcus aureus using an ointment. The research design included manipulation, randomization, and a positive control group. The Kirby-Bauer method was used, revealing inhibition zones: 19.25 mm (25%), 19.625 mm (50%), 24 mm (75%), and 28.25 mm (100%). All concentrations showed high susceptibility, increasing with concentration. Compared to Mupirocin, Psidium guajava at 100% concentration displayed similar susceptibility. Thus, Psidium guajava leaf extract demonstrates antimicrobial efficacy against Staphylococcus aureus comparable to Mupirocin***.***

Keywords: *Psidium guajava*, ointment, Mupirocin, *Staphylococcus aureus*, Kirby-Bauer

INTRODUCTION

Antimicrobial resistance (AMR) arises when bacteria, fungi, parasites, and viruses gradually become unresponsive to antibiotics. This leads to tougher-to-cure infections, heightened risks of severe illness, and even death. Drug resistance complicates treatment, rendering antibiotics and other drugs ineffective. Ongoing threats include new resistance mechanisms in bacteria, producing antibodies. This

study examines *Psidium guajava*'s microbe-fighting potential. Its active ingredient will formulate an ointment, creating a pharmaceutical product against bacterial infections.

Creating a novel organic antimicrobial pharmaceutical product offers a potential strategy to alter the antimicrobial agent pattern, countering self-destructive microorganisms that drive antimicrobial resistance. Research highlights the presence of antimicrobial compounds in plants. In a study conducted by Liu (2017), guava leaf extract was examined for its antibacterial effectiveness against four microorganisms: B. subtilis, P. vulgaris, S. aureus, and S. mutans. These bacteria are major culprits behind food deterioration and foodborne illnesses, contributing to increased morbidity and mortality rates.

In 2019, Antimicrobial resistance (AMR) led to approximately 4.95 million global deaths, surpassing HIV/AIDS and malaria. Of these, resistance directly caused around 1.27 million deaths. The latest Global Research on Antimicrobial Resistance (GRAM) study identified 84 pathogen-drug combinations and 23 infections projected to result in fatalities across 204 countries and territories in 2019. Statistical modeling, based on extensive data sources encompassing 471 million records, including literature, healthcare systems, and monitoring networks, contributed to these estimates (GRAM, University of Oxford, 2022). Addressing this urgent worldwide concern requires bridging a significant gap. To combat further microbial resistance, proactive measures are imperative.

During the research process, no commercially available ointment containing guava leaf extract was identified, leading the researchers to develop this particular dosage form. Ointments offer enhanced stability, lower potential for chemical reactions, greater ease of production, and efficient absorption into affected skin. This study aims to demonstrate the microorganism-killing potential of *Psidium guajava* ointment, evident through the observed zone of inhibition. Furthermore, there is potential for further exploration of *Psidium guajava's*

applications, including its efficacy against bacterial infections causing skin cancer and related disorders, extending beyond its antimicrobial properties.

In response to the escalating global challenge posed by multi- and pan-resistant diseases, the researchers undertook a study involving *Psidium guajava* leaf ointment. This innovative ointment could offer an alternative on the market, effectively countering severe instances of antibacterial resistance. The unique properties of *Psidium guajava* leaves have the potential to inspire novel concepts within the pharmaceutical industry. By encompassing antibacterial formulations and versatile antimicrobial agents, this development aligns with the pharmacy profession's central objective of delivering essential medical solutions and related healthcare products.

This study aims to assess the antibacterial potency of *Psidium Guajava* leaf extract ointment by employing the Kirby-Bauer test to gauge Staphylococcus aureus sensitivity or resistance. Various concentrations of the ointment (25%, 50%, 75%, and 100%) will be tested as experimental controls, revealing antibacterial efficacy through inhibition zones against *Staphylococcus aureus*. To gauge *Psidium guajava*'s efficacy, a positive control (Mupirocin) and a negative control (distilled water) will be employed. Result analysis and interpretation will lead to informed recommendations based on the study's findings.

METHODOLOGY

Design

Experimental design aims to efficiently plan, execute, and assess experiments to derive relevant insights from a limited number of trials. This research followed a true experimental approach involving manipulation, randomization, and a positive control group. The chosen design was a two-group post-test design. The experimental group encompassed *Psidium guajava* leaf extract with ethanolic concentrations of 25%, 50%, 75%, and 100%. The antibacterial activity was measured through the zone of inhibition, with zone

diameter indicating effectiveness. A novel topical antibacterial drug, mupirocin (pseudomonic acid A), hinders bacterial protein and RNA synthesis. Although its effectiveness varies across Gram-positive and Gram-negative bacteria, it notably displays potent in vitro activity against staphylococci and streptococci (Campoli-Rachards *et al*., 2012).

The Kirby-Bauer Test, also known as the Antimicrobial Zone of Inhibition Test, Agar Diffusion Test, Disk Diffusion Test, or Susceptibility Test, offers a rapid means of evaluating a substance's antimicrobial efficacy against a particular pathogen. This examination was standardized by the World Health Organization in 1961, building upon its development in the 1950s (Nelson Lab., 2019).

Laboratory Setting

The experiment occurred in the University of the Visayas' Pharmacy microbiology laboratory. This well-equipped facility featured essential apparatus and tools such as Petri dishes, growth media, pipettes, incubators, and autoclaves, enabling seamless research execution. The laboratory adheres to stringent microbiology standards and regulations to prevent contaminants and ensure researcher safety. Its ample space allowed unrestricted movement, and designated areas were allocated for bio-hazardous equipment. The environment-maintained cleanliness, proper ventilation, and during the experiment, researchers strictly followed guidelines and wore appropriate personal protective equipment (PPE).

Collection of Plant Material

Mature guava leaves (*Psidium guajava*) were meticulously collected from specific premises in Catmon, Cebu City. Harvesting occurred at 5:00 am before sunrise to prevent excessive warmth and rapid deterioration. Selection criteria included aromatic, evergreen leaves with a distinct sub-cretaceous underside and prominent lateral veins (Rodriguez *et al*., 2010). Thorough pest inspection was conducted, and stalks were trimmed with a stainless scissor. Afterward, the leaves underwent two rounds of washing with distilled water in a basin. Drained leaves

were then placed in a plastic zip-lock bag within an ice chest for transportation to the laboratory.

The plant's taxonomic identity was verified by the Department of Agriculture VII in Subangdaku, Mandaue City. Researchers obtained an authentication certificate to confirm the sample's purity, authenticity, and recent harvest from the designated area.

Preparation of *Psidium guajava* leaf extract

The extraction of guava leaves was conducted using the maceration technique. In this process, 2 liters of 95% ethanol were employed as the solvent. A total of 250 grams of guava leaf powder was immersed in the 95% ethanol and placed within a maceration container. The container was covered with aluminum foil or fabric to facilitate the dissolution of the guava leaf powder. Maintained at ambient temperature and shielded from sunlight, the container was left for 24 hours. Stirring was performed three times daily to aid in the maceration process. The resulting filtrate was evaporated in a water bath until it reached a predetermined weight (Gustin et al., 2021).

Formulation of Ointment Obtained from leaf extract of *Psidium guajava*

Initially, macerated *Psidium guajava* leaves were filtered through filter paper and a beaker, ensuring complete filtration. The resulting filtrate was heated in a beaker until all alcohol evaporated. A test was conducted to confirm the absence of alcohol: a small amount of solution was ignited in an evaporating dish, boiling until no flame was observed. Subsequently, the 100% *Psidium guajava* leaves were filtered once more, yielding 6 ml. This was then mixed with white petrolatum, acting as a levigating agent and hydrophilic base. For the ointment base, 5 grams of white petrolatum were measured, melted in a beaker, and stirred for homogeneity. The white petrolatum and aqueous solution were combined, ensuring thorough mixing during the gradual cooling process. The resultant ointment was carefully placed into a labeled container, allowed to cool, and securely sealed to

prevent contamination. Storage in a dry, cool environment was maintained to prevent separation.

Collection of Bacteria

In this research study, Staphylococcus aureus was designated as the target bacterium. However, due to the absence of available cultured bacteria, an alternative approach was taken. A patient living near the Carbon market agreed to contribute a sample for the study. To initiate the process, the patient received counseling, and their pertinent information was recorded for the study's records. A representative from the research team then utilized sterile cotton swabs to collect samples from the patient's wound, conducting this procedure five times. These swabs were promptly placed in sterile petri dishes, which were subsequently stored in an ice bucket to maintain sample integrity during transport to the University of the Visayas laboratory. Following the sample collection, the patient's wound was properly cleaned. Once the swabs were received in the laboratory, they were streaked onto prepared petri dishes and placed in an incubator under the supervision of Mrs. Sacramento. After 24 hours, visible growth was observed, and by the 72-hour mark, maggots were beginning to develop. This 72-hour growth period was crucial before the subsequent step of performing a gram staining procedure to confirm the presence of *Staphylococcus aureus*. Under Dr. Sacramento's guidance, the gram staining confirmed the cultured microorganism's identity. Subsequently, a pure culture of *Staphylococcus aureus* was established, and Petri dishes were prepared for the forthcoming experiment. This comprehensive process ensured the acquisition of a reliable and controlled bacterial sample for the research investigation.

Preparation of Microorganism

The collected and cultivated bacteria were directly inoculated onto the agar plate using a zigzag pattern, starting from the higher side and moving down to the bottom of the plate. It is essential to exercise extra care during the transfer process.

Prior to inoculation, ensure that the inoculating loop is properly disinfected and that pathogens have not been transferred while the loop was still hot. Once the bacteria have been gathered, streak them onto the plate in the specified manner. The plate should then be incubated for a period of 48 to 72 hours at an ambient temperature ranging from 35 to 38 degrees Celsius. This environment promotes bacterial proliferation within the medium. The agar medium chosen for this bacterium was Mueller-Hinton agar (Hudzicki, 2009). This carefully executed process lays the foundation for observing and studying bacterial growth and behavior on the agar plate.

Preparation of Test Solutions

The experimental control utilized in this study was the *Psidium guajava* leaf extract ointment, which served as the basis for creating test solutions. These solutions were prepared by immersing 6 mm discs into varying concentrations of the ointment. To assess the susceptibility of the infectious bacteria, a positive control was employed, involving mupirocin. Before introducing the test solutions and antibacterial medications, the agar plate needed some time to dry. For precise application onto the dried agar medium where the bacteria were cultured, 6 mm filter paper discs were dipped into each antibacterial medication solution. Subsequently, an antimicrobial susceptibility test was conducted to determine the zone of inhibition for both the experimental and control groups. This test aimed to ascertain the impact of *Psidium guajava* leaf extract ointment as an antibacterial agent in treating or eradicating the microorganism (Hudzicki, 2009). The meticulous execution of these steps forms the foundation for evaluating the efficacy of the ointment in combating bacterial growth.

Data Gathering Procedure

The chosen technique for obtaining essential data in this research project was the Kirby-Bauer disk diffusion test. This method allowed the determination of the zone of inhibition, indicating the impact of test solutions on the pathogenic

bacterium S. aureus. This approach served as a reliable means to assess the efficacy of the test solutions. This paragraph effectively justifies the methodology employed in the experiment. To facilitate the study, the researchers initiated the process by seeking permission from the Chief Academic Officer and Dean of the College of Allied Health Sciences. Upon receiving approval, the research team proceeded with the experimentation phase, under the guidance of a qualified adviser and laboratory technician. This systematic approach ensured the proper conduct of the study and maintained adherence to ethical and procedural standards.

Media Preparation

Nutrient agar served as the medium for conducting susceptibility testing of *S. aureus* against both antibiotics and test solutions. In the preparation of the agar solution, 8.4 grams of agar were used for 12 petri dishes, which were then mixed with 300 ml of distilled water. The mixture was heated until boiling to ensure complete dissolution, resulting in a clear solution. The dissolved medium was subsequently autoclaved at 121°C for 15 minutes. After autoclaving, the solution was carefully poured into sterilized petri dishes, maintaining a depth of 2mm. The dishes were sealed immediately to prevent contamination, and aluminum foil was wrapped around them before storing in a refrigerator at a temperature of 2-8°C for preservation (Sapkota, 2022). This precise protocol was followed to create a consistent and controlled environment for the susceptibility testing of S. aureus.

Inoculation and Streaking Procedure

Once the agar plates were properly prepared, the next step involved inoculating individual plates with S. aureus using an inoculation loop. The smearing process began by spreading the inoculum loop over a batch of prepared bacteria. The plate housing the test bacteria was then readied, with the inoculum loop drawing a ring alternately at close intervals. To ensure even distribution, the plate was rotated 60 degrees, and the application process was repeated. Subsequently, the researcher circled the plate's edge with a stick, removing any excess inoculum that

might have splattered near the rim. This stick was then placed in an appropriate container for disposal (Hudzicki, 2009). Following these steps, the researcher allowed the agar to settle at room temperature for a minimum of 3-5 minutes before proceeding to apply the antibiotic disc (Mupirocin) and the test solutions (*Psidium guajava* leaf extract ointment). This careful sequence of actions ensured a controlled and consistent environment for evaluating the impact of the substances on the cultured S. aureus.

Placement of Discs (Antibiotic and Test Solutions)

The disc placement procedure was adapted in the absence of a multidisc dispenser. Instead, the researchers employed an inoculating loop or forceps to position the discs onto the agar surface. A total of 12 agar plates were utilized, with four trials for each concentration (25%, 50%, 75%, and 100%). Each plate contained both the positive control (Mupirocin) and the experimental control (*Psidium guajava*) along with S. aureus. Once the plates were duly prepared, they were covered with their respective lids. Subsequently, discs of approximately 6mm in diameter, containing the various substance concentrations, were carefully inserted onto the agar plates. Following the disc placement, the plates were ready for incubation, marked by the initiation of the incubation process (Hudzicki, 2009). This meticulous approach ensured the systematic evaluation of the inhibitory effects of the substances on the growth of *S. aureus.*

Incubation Period

Subsequent to the disc placement, the next phase involved the incubation period. The *Staphylococcus aureus* cultures were subjected to incubation at a specific temperature range, maintained for a duration of 24 hours. Once the inhibition zone's growth became perceptible, the plates were taken out. On the same day as the removal of the inoculated plates from the incubator, the researchers promptly conducted the measurement of the inhibition zone. This approach ensured

a timely and accurate assessment of the impact of the substances on the bacterial growth, facilitating precise data collection and analysis.

Measurement of Zone of Inhibition

Uniform circular motion measured zone of inhibition with a confluent lawn of growth. Measuring to the nearest millimeter using a ruler or caliper, the zone margin indicated visible growth absence perceptible by the naked eye. To avoid errors, a direct, vertical line of sight was used to prevent parallax effects. If disk location or size impeded diameter reading, researchers measured the radius and multiplied it by two. Growth to disk edge was noted as a 0 mm zone. Gray-shading indicated bacterial growth, white circle – no growth. Zone diameter of test solutions and controls compared, classified as Resistance (R), Intermediate (I), or Susceptible (S) based on standard sizes (Hudzicki, 2009).

Disposal of Materials

Following the experimentation, laboratory materials were disposed of in biohazard waste containers, while glassware such as graduated cylinders, stirring rods, spatulas, mortars, pestles, and beakers were cleaned with detergent and water post-use. Empty glass containers and bottles were appropriately placed in the recycling area. For culture and stocks of infectious agents and associated biologicals, disposal took place in sealed biohazard waste containers at the University of the Visayas-Main Campus Laboratory for Infectious Control. A laboratory technician aided in utilizing the autoclave method to sterilize apparatus and equipment, mitigating the potential transmission of infections causing human diseases. This meticulous approach ensures a safe and responsible handling of laboratory materials and waste.

Statistical Analysis

To ensure result validity, data analysis methods were employed to establish data correlations. Statistical techniques utilized included weighted mean and one-way ANOVA. These methods facilitated the determination of the zone of inhibition

from raw data obtained through laboratory experimentation, under the guidance of a statistician. This rigorous analytical approach enhances the credibility and interpretability of the study's outcomes.

Ethical Consideration

This study not only addresses research challenges and provides solutions but also underscores the importance of ethical considerations. It adheres to the institution's ethical procedures when applicable, ensuring confidentiality of gathered information when needed. As per UVIRB form 2.1F: Request for Exemption from IRB Assessment, Category 1 signifies that this research, dealing solely with organic compounds (Psidium guajava), is exempt from ethical review as it does not involve human participants, human tissues, biological samples, or data. The study's protocol ensures no harm to individuals as it excludes human participation, employing only microbiological samples for experimentation. Minimal risk is involved due to rigorous safety measures taken when handling samples and conducting the experiment. This comprehensive approach ensures both ethical integrity and participant safety.

RESULTS AND DISCUSSION

Zone of Inhibition

The zone of inhibition diameters were assessed using a caliper to evaluate the antimicrobial activity across ious concentrations. Different mediums were employed to generate the following tables. Table 1 presents the diverse concentrations of the experimental group, accompanied by their corresponding mean zone of inhibitions. The test concentrations yielded average means as follows: 19.25 (25%), 19.625 (50%), 24 (75%), and 28.25 (100%). Utilizing the interpretation range of 0 to 8 mm (resistant), 9 to 12 mm (intermediate), and over 13 mm (susceptible), all means were determined to be susceptible.

Table 1. *Concentration of Experimental Groups*

Concentration (%)	Mean	SD	Interpretation
25%	**19.25**	3.37	**Susceptible**
50%	**19.625**	3.58	**Susceptible**
75%	**24**	4.24	**Susceptible**
100%	**28.25**	3.99	**Susceptible**
100%	**29**	4.01	**Susceptible**

Note: 0-8mm resistant, 9-12mm intermediate, >13mm susceptible

Table 2. Post-hoc Test of Experimental Control

Table 2 illustrates the variations in inhibition zone diameter among Psidium guajava leaf extract concentrations (25%, 50%, 75%, and 100%) against Staphylococcus aureus growth. Post hoc test results revealed significant differences in inhibition zone diameter: 25% vs. 50% ($p = 0.997$), 25% vs. 75% ($p = 0.083$), and 25% vs. 100% ($p < 0.001$), with a 3.37 mm difference observed between 25%, 75%, and 100%. Similarly, for the 50% concentration, differences in inhibition diameter were significant: 50% vs. 25% ($p = 0.997$), 50% vs. 75% ($p = 0.123$), and 50% vs. 100% ($p < 0.001$), with a 3.37 mm variation between 25%, 75%, and 100%. These findings underscore the concentration-dependent impact on inhibition zone diameter.

For the 75% concentration, a significant 4.24 mm difference was observed between 25%, 50%, and 100%, with p-values of 0.083 for 75% vs. 25%, 0.123 for 75% vs. 50%, and 0.140 for 75% vs. 100%. Likewise, the 100% concentration displayed a statistically significant 3.99 mm difference compared to 25%, 50%, and 75%, with p-values of < 0.001 for 100% vs. 25%, < 0.001 for 100% vs. 50%, and 0.140 for 100% vs. 75%.

The antibacterial testing revealed that guava leaf methanol and ethanol extracts effectively inhibited gram-positive bacteria, while gram-negative microbes demonstrated resistance to all solvent extracts. The ethanol extract exhibited mean

inhibition zones of 6.11 mm and 11.0 mm against Bacillus cereus and Staphylococcus aureus, respectively. These findings suggest the potential of guava leaf extracts as a natural antibacterial agent (Biswas, 2013)

Table 2. *Post-hoc Test of Experimental Control*

(I) Group	(J)Group	Mean Difference (I-J)	Std. Error	Sig.	Interpretation
Conc_25	Conc_50	-0.375	3.37	0.997	Not Significant
	Conc_75	-4.75	3.37	0.083	Not Significant
	Conc_100	-9	3.37	<.001	Significant
Conc_50	Conc_25	0.375	3.58	0.997	Not Significant
	Conc_75	-4.375	3.58	0.123	Not Significant
	Conc_100	-8.625	3.58	<.001	Significant
Conc_75	Conc_25	4.75	4.24	0.083	Not Significant
	Conc_50	4.375	4.24	0.123	Not Significant
	Conc_100	-4.25	4.24	0.140	Not Significant
Conc_100	Conc_25	9	3.99	<.001	Significant
	Conc_50	8.625	3.99	<.001	Significant
	Conc_75	4.25	3.99	0.140	Not Significant

Note. The mean difference is significant at the level at the 0.05 level.

Table 3 highlights a significant mean difference between Mupirocin and pure 100% Psidium guajava extract. The latter displayed a mean of 13 mm, while the positive control Mupirocin had a mean of 30 mm. ANOVA yielded a p-value of 0.00076 ($\alpha < 0.5$), indicating susceptibility in both samples. Thus, Mupirocin is nearly as effective as 100% Psidium guajava leaf extract, an available market drug.

Banana and guava leaves were air-dried separately before mechanical blending into powder. Antibacterial effects were assessed through One-Way and Two-Way ANOVA, followed by Tukey's test. The study demonstrates P. guajava's efficacy against S. aureus and S. epidermidis (Chavez et al., 2017).

Additionally, Mupirocin, Fusidic acid, and Triple Antibiotic Ointment are topical therapies for skin infections. Comparatively, Guaviderm is more cost-effective, effective against MRSA, and has lower resistance risk due to multiple antibacterial

components (Lazarte, 2017). This research contributes to our understanding of potential alternatives in combating bacterial infections.

Table 3. *Post-hoc test of Positive Control*

(I) Group	(J)Group	Mean Difference (I-J)	Std. Error	Sig.
Mupirocin A	Mupirocin B	-0.5	1.29	0.958
	Pure A	17	1.29	<.001
	Pure B	16.5	1.29	<.001
Mupirocin B	Mupirocin A	0.5	1.63	0.958
	Pure A	17.50	1.63	<.001
	Pure B	17	1.63	<.001
Pure A	Mupirocin A	-17	1.29	<.001
	Mupirocin B	-17.50	1.29	<.001
	Pure B	-0.5	1.29	0.958
Pure B	Mupirocin A	-16.5	1.41	<.001
	Mupirocin B	-17	1.41	<.001
	Pure A	0.5	1.41	0.958

One-way ANOVA was used to calculate the mean zone of inhibition for both the experimental group and the positive control. The null hypothesis (Ho) was rejected based on the computed F-value of 192.8333 and a p-value of 2.05-10, which is below the 0.05 threshold. Consequently, a significant difference exists in the mean zone of inhibition between the experimental group and the positive control. *Pseudomonas fluorescens* utilizes modular polyketide synthases to produce mupirocin (MUP), also known as bactroban or pseudomonic acid, a natural crotonic acid derivative. This antibiotic's unique chemical composition and mechanism of action involve a blend of A-D pseudomonic acids that inhibit the bacterial enzyme isoleucyl-tRNA synthetase, thereby hindering protein synthesis. MUP is commonly prescribed for treating skin and soft tissue infections caused by Staphylococcus species. It serves as a preferred option for nasal decontamination during MRSA outbreaks and prevalent Staphylococcus aureus cases. MUP also aids in preventing outbreaks and recurrent infections. Global emergence of MUP

resistance, particularly in methicillin-resistant Staphylococcus aureus (MRSA) isolates, is linked to widespread MUP use. Resistance prevalence varies geographically, with MRSA showing varying levels of resistance to MUP. This review delves into MUP's synergistic action and mechanism, outlines worldwide MUP resistance prevalence, and offers novel insights into its clinical applications (Khoshnood *et al*., 2019).

Table 4. *ANOVA between Experimental Control and Positive Control*

Source of Variation	F value	p-value	Decision	Interpretation
Between groups	**192.8333**	**2.05^{-10}**	**Reject**	**Significant**

Note: Sig α <0.05

CONCLUSION AND RECOMMENDATION

This study employed the Kirby-Bauer disk diffusion method to assess the antimicrobial activity of Psidium guajava leaf extract and Mupirocin ointment, revealing distinct zones of inhibition. The mean inhibition zone diameters for different concentrations were: 19.25 mm (25%), 19.625 mm (50%), 24 mm (75%), and 28.25 mm (100%). All concentrations exhibited high susceptibility. Notably, there was a significant increasing trend in effectiveness across concentrations. Comparing Mupirocin and 100% Psidium guajava leaf extract, Mupirocin showed greater susceptibility. However, the 100% Psidium guajava concentration remained susceptible. Thus, no significant difference exists between *Psidium guajava* leaf extract and Mupirocin ointment against *Staphylococcus aureus*. *Psidium guajava* displays strong antimicrobial efficacy against Staphylococcus aureus at 100% concentration, closely resembling Mupirocin's effectiveness due to similar outcomes.

In summary, this study's findings suggest several promising directions for further harnessing the potential of *Psidium guajava* leaf extract as a versatile

antimicrobial agent. Exploring different solvent systems for extraction could optimize its bioactive compound profile, potentially enhancing its potency against various pathogens. Investigating synergistic effects with other natural compounds or antibiotics may lead to the development of novel therapeutic formulations, addressing concerns related to antimicrobial resistance. Broadening the scope of research to include a diverse panel of microorganisms, both bacterial and fungal, could uncover its wider antimicrobial spectrum. Clinical trials could validate its efficacy for applications beyond antibacterial activity, such as wound healing and skin disorders. Developing innovative delivery systems could enhance its bioavailability and stability. Additionally, collaboration with traditional healers and indigenous communities could bridge traditional knowledge with scientific research, yielding new applications rooted in indigenous practices. By pursuing these avenues, the antimicrobial efficacy of *Psidium guajava* leaf extract could be fully realized, offering multifaceted benefits to medicine, healthcare, and natural product development.

REFERENCES

Abdallah, M. S., Nas, F. S., & Ali, M. (2019). Antibacterial Activity of Psidium guajava Leaf and Stem Bark Extracts against Clinical Isolates of... ResearchGate. https://www.researchgate.net/publication/333669708_Antibacterial_Activity_of_Psidium_guajava_Leaf_and_Stem_Bark_Extracts_against_Clinical_Isolates_of_Staphylococcus_aureus_and_Salmonella_typhi

Azizan, N., Zarina, N., Wahab, N. Z. A., & Othman, A. S. (2020). Antimicrobial activity of psidium guajava leaves extracts against foodborne pathogens. ResearchGate. https://doi.org/10.37200/IJPR/V24I7/PR270969

Biswas, B., Rogers, K. B., McLaughlin, F., Daniels, D. L., & Yadav, A. (2013). Antimicrobial Activities of Leaf Extracts of Guava (Psidium guajavaL.) on Two Gram-Negative and Gram-Positive Bacteria. International Journal of Microbiology, 2013, 1–7. https://doi.org/10.1155/2013/746165

Brady, M. S., & Katz, S. E. (1990). Factors influencing optimization of diffusion assays for antibiotics. Journal - Association of Official Analytical Chemists, 73(2), 202–205.

Chambers, H. F., & DeLeo, F. R. (2009). Waves of resistance: Staphylococcus aureus in the antibiotic era. Nature Reviews Microbiology, 7(9), 629–641. https://doi.org/10.1038/nrmicro2200

Chavez, F. (n.d.). Antimicrobial effects of the ethanol extracts of banana leaves (Musa sapientum) and guava leaves (Psidium guajava) on staphylococcus aureus, staphylococcus epidermis, and Escherichia coli. GreenPrints. https://greenprints.dlshsi.edu.ph/pharmacology/11/

Dadashi, M., Hajikhani, B., Darban-Sarokhalil, D., Van Belkum, A., & Goudarzi, M. (2020). Mupirocin resistance in Staphylococcus aureus: A systematic review and meta-analysis. Journal of Global Antimicrobial Resistance, 20, 238–247. https://doi.org/10.1016/j.jgar.2019.07.032

Daswani, P. G., Gholkar, M. S., & Birdi, T. J. (2017). Psidium guajava: A single plant for multiple health problems of the rural Indian population. Pharmacognosy Reviews, 11(22), 167. https://doi.org/10.4103/phrev.phrev_17_17

https://www.hindawi.com/journals/ijmicro/2013/746165/#materials-and-methods. (n.d.). Informatics from Technology Networks; www.technologynetworks.com. Retrieved May 14, 2022, from https://www.technologynetworks.com/informatics/articles/one-way-vs-two-way-anova-definition-differences-assumptions-and-hypotheses-306553

Laboratory Waste. (n.d.). Office of Environmental Health and Safety. https://ehs.princeton.edu/laboratory-research/laboratory-safety/research-waste-management/laboratory-waste

Lucky, E., Jacob, I., Ebiala, F. I., & Chukwuka, E. P. (2020). antibacterial activity of aqueous and ethanolic leaves extract OF Psidium guajava. ResearchGate

Mackenzie, R. J. (2021). One-Way vs Two-Way ANOVA: Differences, Assumptions, and Hypotheses. Informatics From Technology Networks. https://www.technologynetworks.com/informatics/articles/one-way-vs-

two-way-anova-definition-differences-assumptions-and-hypotheses-306553

Medina, N. N. R., & Herrero, J. V. (2016). Guava (Psidium guajava L.) Cultivars. In Elsevier eBooks (pp. 287–315). https://doi.org/10.1016/b978-0-12-408117-8.00013-1

Nelson Labs. (2023, March 27). Zone of Inhibition - Nelson Labs. https://www.nelsonlabs.com/testing/zone-of-inhibition/

Omari, M. M. A., Jaafari, D., Al-Sou'od, K. A., & Badwan, A. A. (2014). Moxifloxacin Hydrochloride. In Elsevier

A Comparative Study of Patients' Satisfaction with Complete Denture Prosthesis in The New Normal Environment

Rogelie Alyssa Cagulada
Rachelle Dublin
Ina Ragotero

Department of Dentistry, College of Allied Health Sciences, University of the Visayas

ABSTRACT

This study investigated patient satisfaction following the use of complete dentures during the pandemic. Employing a descriptive research design, data were collected through the Patient's Denture Assessment (PDA) tool. Convenient sampling was utilized among respondents within Cebu province. Results demonstrated high levels of satisfaction across various demographics, including gender, age, and marital status. Furthermore, no statistically significant distinctions were identified between satisfaction levels and these demographic factors. This research provides valuable insights into the contentment of patients using complete dentures during the pandemic, highlighting consistent satisfaction regardless of individual characteristics.

Keywords: Patients' Satisfaction, Denture Prosthesis, New Normal Environment

INTRODUCTION

Considerable discussion has focused on the various factors influencing a patient's satisfaction with complete denture prostheses, beyond just the denture quality. Despite the development of complete dentures, not all patients are equally satisfied, indicating variations in satisfaction levels among individuals. This

phenomenon has also been observed during the new normal environment introduced by the COVID-19 pandemic, which significantly impacted urgent dental care.

During the pandemic, it can be observed that all prosthesis users showed a heightened interest in dental hygiene and an increased frequency of cleaning their prostheses. However, due to the unpredictable safety conditions in the new environment, some patients have reported satisfaction, while others have experienced dissatisfaction. Consequently, it becomes evident that offering scientifically reliable information on prosthetic care during a pandemic would be immensely advantageous for all patients.

The emergence of the new normal environment significantly impacted dental procedures and processes. In 2019, patients had complete dentures; however, during the 2020 lockdown enforced due to the pandemic, they were unable to visit their dentists for necessary adjustments. This situation became challenging for both patients and dentists, as they sought a safe time to provide consultations and treatments. A study by Degirmenci and Kalaycioglu (2021) highlighted dental procedures as being among the highest risk categories for viral transmission, encompassing both aerosol and non-aerosol transmission. As a result, the decision was made to postpone all dental treatment except for urgent cases. Consequently, non-emergency treatments, including prosthetic treatment and routine maintenance appointments, were also delayed.

Indeed, the rehabilitation of edentulous patients has always posed challenges. Oweis et al. (2022) emphasized that several factors can influence the quality of complete dentures and, consequently, impact patient satisfaction levels. It is evident that some patients express dissatisfaction with the complete dentures provided to them, and they might even have specific preferences regarding the type of denture they desire. Nevertheless, Soboleva and Rogovska (2022) revealed that conventional complete dentures remain a preferred treatment choice. However,

despite this preference, there is no consensus on the most critical factors that could significantly reduce the risk of patient dissatisfaction.

During the pandemic, it can be observed that all prosthesis users showed a heightened interest in dental hygiene and an increased frequency of cleaning their prostheses. However, due to the unpredictable safety conditions in the new environment, some patients have reported satisfaction, while others have experienced dissatisfaction. Consequently, it becomes evident that offering scientifically reliable information on prosthetic care during a pandemic would be immensely advantageous for all patients.

Certainly, the pandemic has posed significant challenges for patients in visiting their dentists, which, in turn, has put pressure on their level of satisfaction. As dental students, the researchers observed that no previous study had been conducted on Complete Denture Prosthesis (CDP) regarding patient satisfaction during the new normal environment brought about by the pandemic. While a few studies on complete denture patients existed, the limited information available created an opportunity for further research to be carried out in this area, specifically in evaluating patient satisfaction after receiving CDP services during the new normal environment.

Addressing this research gap became a crucial objective, and conducting an evaluative study to assess patient satisfaction with complete denture prostheses in the context of the new normal environment was deemed highly relevant. This study aimed to fill the identified knowledge gap and provide valuable insights into the impact of the pandemic on patient satisfaction in the realm of CDP.

METHODOLOGY

Research Design

The study employed a descriptive research design, which systematically described a phenomenon, situation, or population by addressing the what, when,

where, and how questions rather than the why. The method involved identifying, observing, and measuring variables without controlling or manipulating them. (Voxco, 2022).

Research Environment

The study was conducted in the province of Cebu, a large island in the Visayas region of the Philippines. Cebu is surrounded by several small islands, with Negros Island to the west across the Tañon Strait and Leyte and Bohol to the east. The main urban area, Metro Cebu, is situated along Cebu Island's long east coast. It is the second-largest urban region in the country, following Metro Manila, and serves as the primary urban center for both the province and the larger Visayas region. Cebu City, often referred to as the Queen City of the South, serves as the central city of Metro Cebu.

Research Respondents

The study's respondents were both commercial and non-commercial complete denture patients from Cebu province, chosen through convenient sampling. Convenience sampling involves collecting samples from conveniently located individuals who were readily available and willing to participate in the study. The study included individuals who had already received complete dentures in the past. Individuals without complete dentures were not included in the study.

Instrument

The study utilized a modified version of the Patient's Denture Assessment (PDA) questionnaire, originally developed in Japanese by Namano and Komin (2021) for edentulous patients with complete dentures at the Tokyo Medical and Dental University, Japan. The questionnaire items were revised or modified to assess patient satisfaction in areas like function, aesthetics and speech, lower denture, expectation, upper denture, and importance. The questionnaire uses the following parametric scaling:

Scale	Parameters	Verbal Interpretation
5	4.21 – 5.00	Very Satisfied
4	3.41 – 4.20	Satisfied
3	2.41 – 3.40	Unsure
2	1.81 – 2.40	Dissatisfied
1	1.00 – 1.80	Very Dissatisfied

Data Gathering Procedure

The study first received approval from the Dean for the title hearing. Afterward, Chapters 1 to 3 were drafted and presented for approval at a Design hearing with a panel of experts. Subsequently, the paper was submitted for approval to the university's research authorities.

Upon the release of the notice, data gathering commenced, and respondents were selected based on the inclusion and exclusion criteria. Questionnaires were administered and collected on the same day. The collected responses underwent both descriptive and inferential statistical analysis. At the study's conclusion, the answered questionnaires were securely destroyed by shredding.

Statistical Treatment of Data

In the study, the following descriptive and inferential statistics were employed:

Frequency and Simple Percentage: Used to compute and present data related to the profile of the respondents.

Mean Score: Utilized to measure the level of patient satisfaction.

Analysis of Variance (ANOVA): Employed to investigate any significant differences in the level of patient satisfaction when the respondents were grouped based on their profiles.

Ethical Consideration

Ethical considerations are of paramount importance in human participant studies. The researchers followed fundamental ethical guidelines set by the university to ensure the study's ethical soundness.

RESULTS AND DISCUSSION

Table 1. *Distribution of the Respondents*

Demographic Variables	Groups	Frequency	Percentage
Age	21-30	1	1.4
	41-50	10	14.3
	51-60	17	24.3
	61-70	31	44.3
	71-80	8	11.4
	Above 80	3	4.3
Sex	Male	34	48.6
	Female	36	51.4
Civil Status	Single	6	8.6
	Married	49	70.0
	Widow/Widower	15	21.4

Table 1 summarizes the profile of the 70 patients in the study. The majority, 44.3%, are aged 61-70 years, followed by 24.3% aged 51-60 years. Females account for 51.4%, while males make up 48.6%. Regarding marital status, 70.0% are married, 21.4% are widowed, and 8.6% are single. The study's findings indicate that the majority of respondents are older married females who have been using complete dentures. This aligns with the Centers for Disease Control and Prevention's (2021) article, which reveals higher complete tooth loss prevalence among adults aged 75 and older (26%) compared to those aged 65-74 (13%).

Table 2. *Level of Patient Satisfaction after a complete denture as to function*

Indicators	Weighted Mean	Interpretation
1. Experiencing pain with a complete denture. (*Pagsinati sa kasakit sa us aka kumpleto nga pustiso)*	4.81	Very Satisfied
2. The easiness of swallowing food boluses and water. (*Ang kasayon sa pagtulon sa pagkaon ug tubig)*	4.89	Very Satisfied
3. Enjoyment with every meal. (*Kalipay sa matag pagkaon)*	4.86	Very Satisfied
4. Experiencing a worn-out jaw. (*Pagsinati sa guba nga apapangig)*	4.84	Very Satisfied
Overall Weighted Mean	**4.85**	**Very Satisfied**

Level of Patient Satisfaction after a Complete Denture Based on the Patient's Denture Assessment (PDA)

As indicated in Table 2, the patients expressed high satisfaction with the function of their complete dentures, with an overall weighted mean of 4.85. They reported experiencing ease in swallowing foods and enjoying their meals, indicating that the dentures served their purpose effectively. The use of complete dentures resulted in pain-free and hassle-free eating, providing a natural and comfortable fit. This suggests that complete dentures are a viable and sufficient option compared to mandibular overdenture implants, as highlighted by Soboleva and Rogovska (2022). The purpose of complete dentures is to ensure the optimal fit of upper and lower dentures for improved mastication efficiency (The Denture and Implant Clinic, 2017).

Table 3. *Level of Patient Satisfaction after a Complete Denture as to Aesthetics and Speech*

Indicators	**Weighted Mean**	**Interpretation**
1. Worrying about other people watching. (*Nabalaka sa laing mga tawo nga nagtan-aw)*	4.84	Very Satisfied
2. The easiness of speaking. (*Ang kasayon sa pagsulti)*	4.87	Very Satisfied
3. Worrying about the mouth. (*Nabalaka mahitungod sa baba)*	4.86	Very Satisfied
4. Experiencing clicking of dentures when chewing. (*Pagsinati sa pag klik sa mga pustiso kung mag-usap)*	4.83	Very Satisfied
Overall Weighted Mean	**4.85**	**Very Satisfied**

Scale: Very Satisfied – 4.21-5.00, Satisfied – 3.41-4.20, Unsure – 2.41-3.40, Dissatisfied – 1.81-240, Very Dissatisfied – 1.00-1.80

Table 3 reveals high patient satisfaction with the aesthetics and speech aspects of their complete dentures, as indicated by an overall weighted mean of 4.85. Respondents reported ease in speaking without concerns about their appearance in front of others, even though some experienced clicking during chewing. The results suggest that complete dentures offer advantages to patients, improving oral-health-related quality of life and providing expected aesthetics while enabling normal speech. This finding is supported by Soboleva and Rogovska (2022), who emphasized that complete dentures increase patient satisfaction by offering occlusal support for adequate mastication and overall comfort.

Table 4. *Level of Patient Satisfaction after a Complete Denture as to Lower Denture*

Indicators	Weighted Mean	Interpretation
1. Food debris stuck under the lower denture. (*Ang mga tinumpag sa pagkaon natapot ilawom sa ubos sa mga pustiso)*	4.80	Very Satisfied
2. Retention of the lower denture on the ridge. (*Pagpabilin sa ubos nga pustiso)*	4.86	Very Satisfied
3. Fitting of the lower denture.*(Pagbutang sa ubos nga pustiso)*	4.84	Very Satisfied
4. Uncomfortable lower denture.(*Dili kumportable sa ubos nga pustiso)*	4.79	Very Satisfied
Overall Weighted Mean	**4.82**	**Very Satisfied**

Scale: Very Satisfied – 4.21-5.00, Satisfied – 3.41-4.20, Unsure – 2.41-3.40, Dissatisfied – 1.81-240, Very Dissatisfied – 1.00-1.80

Table 4 indicates high patient satisfaction with the lower denture, as reflected by the overall weighted mean of 4.82. The respondents were entirely content as their lower denture fit well and stayed securely on the ridge, without encountering any issues like food debris getting stuck. This demonstrates that obtaining a complete denture and ensuring a proper fit for the lower denture can greatly enhance patient satisfaction. The study by Bhutta et al. (2022) supports these findings, where patients expressed high satisfaction due to improved chewing ability and a well-fitted lower complete denture, leading to greater overall acceptance of the complete denture.

Table 5. *Level of Patient Satisfaction after a Complete Denture as to Expectation*

Indicators	Weighted Mean	Interpretation
1. On the expected satisfactory level of a new denture.(*Sa gipaabot nga makatagbaw nga lebel sa bag-ongpustiso)*	4.77	Very Satisfied
2. On the expected problems of a new denture (Sa gipaabot nga problems sa bag-ong pustiso)	4.86	Very Satisfied
3. On the expected fitting of a new denture (Sa gipaabot nga pagkahaom sa bag-ong pustiso)	4.86	Very Satisfied
Overall Weighted Mean	**4.83**	**Very Satisfied**

Scale: Very Satisfied – 4.21-5.00, Satisfied – 3.41-4.20, Unsure – 2.41-3.40, Dissatisfied – 1.81-240, Very Dissatisfied – 1.00-1.80

Table 5 reveals that the respondents expressed high satisfaction with their complete dentures regarding their expectations, as indicated by an overall weighted mean of 4.83. They were very pleased with the fit and comfort of the new dentures, experiencing no problems while wearing them. The complete dentures met their expectations in terms of mastication, speech, comfort, and aesthetics. However, it is noteworthy that the patients' expectations were even higher than their level of satisfaction.

Table 6. *Level of Patient Satisfaction after a Complete Denture as to Upper Denture*

Indicators	Weighted Mean	Interpretation
1. Food debris stuck under the upper denture (*Ang mga tinumpag sa pagkaon natapot ilawom sa ibabaw nga pustiso)*	4.71	Very Satisfied
2. Fitting of the upper denture (*Pagbutang sa ibabaw nga pustiso)*	4.84	Very Satisfied

3. Falling down of the upper denture (*Pagkahulog sa ibabaw nga pustiso)*	4.83	Very Satisfied
Overall Weighted Mean	**4.80**	**Very Satisfied**

Scale: Very Satisfied – 4.21-5.00, Satisfied – 3.41-4.20, Unsure – 2.41-3.40, Dissatisfied – 1.81-240, Very Dissatisfied – 1.00-1.80

Based on Table 6, the patients displayed a very high level of satisfaction regarding their complete dentures, particularly with the fitting of the upper denture, as evidenced by an overall weighted mean of 4.80. They were extremely satisfied as the upper denture remained securely in place without any food debris getting stuck. The researchers observed that proper fitting of the upper denture contributed to its improved functionality, preventing it from easily falling out and ensuring a proper fit in the upper portion of the mouth.

The result suggests that even if the upper denture is aesthetically pleasing, its fitting is crucial to prevent any likelihood of it falling out. This finding aligns with a related study by Kola et al. (2017), which reported high patient satisfaction in individuals undergoing fixed prosthodontic treatment and being satisfied with the masticatory ability of the fixed prosthesis.

Table 7. Level of Patient Satisfaction after a Complete Denture as to Importance

Indicators	**Weighted Mean**	**Interpretation**
1. Considering dentures as part of the body (*Pagkonsiderar sa pustiso isip bahin sa lawas)*	4.80	Very Satisfied
2. Importance of the denture (*Ang kamahinungdanon sa pustiso)*	4.86	Very Satisfied
3. Caring dentures without difficulty (*Pag-atiman sa pustiso nga walay kalisud)*	4.84	Very Satisfied
4. Feeling at ease when wearing the denture (*Kahayahay ang pagbati kung magsul-ob sa pustiso)*	4.84	Very Satisfied

Overall Weighted Mean	**4.84**	**Very Satisfied**

Note: Differences were computed at 5% level of significance. If p-value is less than 0.05, there is a significant difference, thus reject Ho. If otherwise, there is no significant difference, therefore accept Ho

According to Table 7, the respondents expressed a very high level of satisfaction with the importance of having complete dentures, evident in the overall weighted mean of 4.84. They perceived complete dentures as crucial, feeling at ease while using them and finding no difficulty in caring for them. Complete dentures were considered important as they resembled real teeth and contributed to preserving and improving facial health and structure.

The results indicate that the higher the respondents valued complete dentures' importance, the higher their satisfaction level. The respondents willingly chose complete dentures, and their overall satisfaction and satisfaction with specific aspects support the significance of complete dentures in their oral health. These findings align with Soboleva and Rogovska (2022), who highlighted patient satisfaction's dependence on how patients considered complete dentures an essential aspect of their oral health.

Table 8. *Independent Samples T-test: Significant difference in the Level of Patient Satisfaction after a complete denture based on the PDA when grouped to Sex*

Variables	**Sex**	**Mean**	***t***	***p*-value**	**Decision**	**Interpretation**
Function	Male	4.8088	-0.899	0.372	Accept Ho	Not Significant
	Female	4.8889				
Aesthetics and Speech	Male	4.8309	-0.467	0.642	Accept Ho	Not Significant
	Female	4.8681				
Lower Denture	Male	4.8015	-0.477	0.635	Accept Ho	Not Significant
	Female	4.8403				

Expectation	Male	4.7843	-0.958	0.341	Accept Ho	Not Significant
	Female	4.8704				
Upper Denture	Male	4.7745	-0.39	0.698	Accept Ho	Not Significant
	Female	4.8148				
Importance	Male	4.8162	-0.435	0.665	Accept Ho	Not Significant
	Female	4.8542				

Table 8 presents the results of an independent samples T-test, which found no significant difference in the level of patient satisfaction between males and females regarding complete dentures. All p-values were below 0.05, leading to the failure to reject the null hypothesis. This aligns with Devi et al.'s study (2022), indicating that gender does not affect patient satisfaction with complete dentures. However, the finding contrasts with Carllson et al.'s research (as cited by Mushtaha et al., 2020), where males were more satisfied than females. Overall, the current study suggests that both genders have similar expectations and satisfaction with their complete dentures.

Table 9. *Significant difference in the Level of Patient Satisfaction after a complete denture based on the Patient's Denture Assessment (PDA) when grouped according to Civil Status*

Variables	**Civil Status**	**Mean**	***t***	***p*-value**	**Decision**	**Interpretation**
Function	Single	4.5	3.101	0.052	Accept Ho	Not Significant
	Married	4.8878				
	Widow/Widower	4.8667				

Aesthetics and Speech	Single	4.625	2.611	0.081	Accept Ho	Not Significant
	Married	4.9031				
	Widow/Widower	4.7667				
Lower Denture	Single	4.5833	1.724	0.186	Accept Ho	Not Significant
	Married	4.852				
	Widow/Widower	4.8167				
Expectation	Single	4.7222	1.409	0.252	Accept Ho	Not Significant
	Married	4.8776				
	Widow/Widower	4.7111				
Upper Denture	Single	4.6667	1.358	0.264	Accept Ho	Not Significant
	Married	4.8503				
	Widow/Widower	4.6667				
Importance	Single	4.5833	1.665	0.197	Accept Ho	Not Significant
	Married	4.8673				
	Widow/Widower	4.8333				

Table 9 shows that there were no significant differences in the level of patient satisfaction across all indicators (function, aesthetics and speech, lower denture, expectation, upper denture, and importance) for single, married, widow, and widower participants. All p-values were less than 0.05, leading to the failure to reject the null hypothesis.

The results suggest that respondents' level of satisfaction remains consistent regardless of their civil status. This finding is supported by the study by Yao et al. (2018), which found that implant-supported fixed complete dentures and overdentures increased patient satisfaction regardless of gender and civil status. Similarly, the study by Kashbur et al. (2019) reported overall patient satisfaction with fixed prosthodontic treatment regardless of age level and civil status.

Table 10. *Significant difference in the Level of Patient Satisfaction after a complete denture based on the Patient's Denture Assessment (PDA) when grouped according to Civil Status*

Variables	**Civil Status**	**Mean**	**F**	***p*-value**	**Decision**	**Interpretation**
Function	Single	4.5	3.101	0.052	Accept Ho	Not Significant
	Married	4.8878				
	Widow/Widower	4.8667				
Aesthetics and Speech	Single	4.625	2.611	0.081	Accept Ho	Not Significant
	Married	4.9031				
	Widow/Widower	4.7667				
Lower Denture	Single	4.5833	1.724	0.186	Accept Ho	Not Significant
	Married	4.852				

	Widow/Widower	4.8167				
Expectation	Single	4.7222	1.409	0.252	Accept Ho	Not Significant
	Married	4.8776				
	Widow/Widower	4.7111				
Upper Denture	Single	4.6667	1.358	0.264	Accept Ho	Not Significant
	Married	4.8503				
	Widow/Widower	4.6667				
Importance	Single	4.5833	1.665	0.197	Accept Ho	Not Significant
	Married	4.8673				
	Widow/Widower	4.8333				

Note: Differences were computed at 5% level of significance. If p-value is less than 0.05, there is a significant difference, thus reject Ho. If otherwise, there is no significant difference, therefore accept Ho

Table 10 shows that there were no significant differences in the level of patient satisfaction across all indicators (function, aesthetics and speech, lower denture, expectation, upper denture, and importance) for single, married, widow, and widower participants. All p-values were less than 0.05, leading to the failure to reject the null hypothesis.

The results suggest that respondents' level of satisfaction remains consistent regardless of their civil status. This finding is supported by the study by Yao et al.

(2018), which found that implant-supported fixed complete dentures and overdentures increased patient satisfaction regardless of gender and civil status. Similarly, the study by Kashbur et al. (2019) reported overall patient satisfaction with fixed prosthodontic treatment regardless of age level and civil status.

CONCLUSION AND RECOMMENDATION

Based on the findings, the study concluded that the patients have a very high level of satisfaction involving the evaluated indicators of function, aesthetics and speech, lower denture, expectation, upper denture and importance. Their profiles of age, sex, and civil status are not operant to cause any difference as to their level of satisfaction from wearing complete denture during the pandemic

REFERENCES

Afrashtehfar, K. I., Assery, M., & Bryant, S. R. (2020). Patient satisfaction in medicine and dentistry. *International Journal of Dentistry*, *2020*, 6621848. https://doi.org/10.1155/2020/6621848

Bhutta, H.E., Moharamzadeh, K., Martin, R. et al. (2022) Patient satisfaction with upper and lower complete dentures: A service evaluation report. *European Journal of Prosthodontics and Restorative Dentistry.* ISSN 0965-7452

Borges, G. A., Barbin, T., Dini, C., Maia, L. C., Magno, M. B., Barão, V., & Mesquita, M. F. (2022). Patient-reported outcome measures and clinical assessment of implant-supported overdentures and fixed prostheses in mandibular edentulous patients: A systematic review and meta-analysis. *The Journal of Prosthetic Dentistry*, *127*(4), 565–577. https://doi.org/10.1016/j.prosdent.2020.11.005

Centers for Disease Control and Prevention (2021). Facts about older adult patients. https://www.cdc.gov/oralhealth/basics/adult-oral-health/adult_older.htm

Ceraulo, S.; Caccianiga, P.; Casto, C.; Baldoni, M.; Caccianiga, G. (2022). COVID-19 and prosthetic emergencies, home care in fragile patients: A case report. *Healthcare 10,* 1407. https://doi.org/ 10.3390/healthcare10081407

Degirmenci, K., & Kalaycioglu, O. (2021). Evaluation of quality of life and oral hygiene attitudes of individuals using dental prostheses during the

COVID-19 pandemic. *The Journal of Prosthetic Dentistry*, *126*(1), 51.e1–51.e7. https://doi.org/10.1016/j.prosdent.2021.03.022

Devi, B. V., Ahmed, N., Ganapathy, D., Maiti, S., & Pandurangan, K. K. (2022). Expectation of treatment outcomes in complete denture wearers. *Journal of advanced pharmaceutical technology & research*, *13*(Suppl 1), S277–S281. https://doi.org/10.4103/japtr.japtr_358_22

Geiballa, GH., Abubakr, NH. & Ibrahim, YE. (2016). Patients' satisfaction and maintenance of fixed partial denture. *Eur J Dent. 10*(2):250–3. doi: 10.4103/1305-7456.178313.

Ismail, N., Alzaer, H., Algurini, AH., Alsawalhi, DH., Hait, SM., Alsoleihat, F., Mahmoud, SJ. (2021). Patients satisfaction with the dental treatment provided at the University of Jordan students Clinics. https://doi.org/10.21203/rs.3.rs-1153823/v1

Kashbur, N. & Bugaighis, I. (2019). Patients' satisfaction, expectation, care, and maintenance of fixed prosthesis. *Libyan Int Med Univ J. 4.* 26–32. doi: 10.4103/LIUJ.LIUJ_42_18.

Kola, MZ., Alqahtani, F., Alqarni, AAM., Alharbi, TGH. & Almutairi, MNB. (2017). Assessment of level of satisfaction and problems in patients treated with fixed partial denture in Alkharj City (Kingdom of Saudi Arabia) *Int J Med Heal Res. 3*(5):53–8.

Mushtaha, W., Elhout, W., Seyam, A. & Harb, H. A. (2020). Patient satisfaction with complete denture prosthesis made by clinical year students at the faculty of dentistry, Al Azhar University – Gaza. *International Journal of Academic Health and Medical Research (IJAHMR) 4*(10), 1-6. www.ijeais.org/ijahmr

Nand, M., and Mohammadnezhad, M. (2022). Challenges faced by edentulous patients (EDPs) during complete denture prostheses (CDP) service delivery in Fiji – A qualitative study. *BMC Health Serv Res 22,* 742. https://doi.org/10.1186/s12913-022-08136-6

Oweis, Y., Ereifej, N., Al-Asmar, A., & Nedal, A. (2022). Factors affecting patient satisfaction with complete dentures. *International Journal of Dentistry*, 9565320. https://doi.org/10.1155/2022/9565320

Pascoe G. C. (1983). Patient satisfaction in primary health care: A literature review and analysis. *Evaluation and Program Planning. 6*(3-4):185–210. doi: 10.1016/0149-7189(83)90002-2.

Soboleva, U., & Rogovska, I. (2022). Edentulous patient satisfaction with conventional complete dentures. *Medicina (Kaunas, Lithuania), 58*(3), 344. https://doi.org/10.3390/medicina58030344

Shrestha, L., Dahal, S., Pradhan, D., & Lohani, J. (2020). Satisfaction level among patients treated with fixed dental prosthesis in a tertiary care hospital: a descriptive cross-sectional study. *JNMA; Journal of the Nepal Medical Association*, *58*(221), 15–19. https://doi.org/10.31729/jnma.4720

Thalji, G., McGraw, K., & Cooper, L. F. (2016). Maxillary complete denture outcomes: a systematic review of patient-based outcomes. *The International Journal of Oral & Maxillofacial Implants, 3,* s169–s181. https://doi.org/10.11607/jomi.16suppl.g5.1

The Denture and Implant Clinic (2017). What are the benefits of complete dentures? https://www.thedentureclinic.co.uk/blog/benefits-of-complete-dentures

Teng, CJ., Lin, SC., Chen, JH. *et al*. (2020) The association between denture self-satisfaction rates and OHRQoL - a follow-up study. *BMC Oral Health 20,* 140. https://doi.org/10.1186/s12903-020-01119-1

Voxco (2021). What is descriptive research? https://www.voxco.com/blog/descriptive-research-design/#

Yao, C. J., Cao, C., Bornstein, M. M., & Mattheos, N. (2018). Patient-reported outcome measures of edentulous patients restored with implant-supported removable and fixed prostheses: A systematic review. *Clinical Oral Implants Research*, 29(16), 241–254. https://doi.org/10.1111/clr.13286

Yu-Jui, J., Jing-Rung, L. & Jung-Fu, H. (2021). Patient satisfaction, clinical outcomes and oral health-related quality of life after treatment with traditional and modified protocols for complete dentures. *Journal of Dental Sciences. 16*(1). 236-240.