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Association between Stress, Anxiety, Depression, and Irritable Bowel Syndrome among Students in a Palestinian University: A Cross-Sectional Study

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THESIS APPROVAL

Association between Stress, Anxiety, Depression, and Irritable Bowel Syndrome (IBS) Among Students in a Palestinian University: A Cross-Sectional Study

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This thesis was defended successfully on 21 January 2024 and approved by:

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DECLARATION

I declare that the work in this study titled “Association between stress, anxiety, depression and irritable bowel syndrome (IBS) among students in a Palestinian university: A cross-sectional study” was carried out by me under the supervision of Dr. Dalia Toqan in the Department of Nursing .

In addition, I understand the nature of plagiarism and am aware of the University's policy on this .

The work provided in this thesis, unless otherwise referenced, is the researcher's own work and has not been submitted by others elsewhere for any other degree or qualification.

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DEDICATION

This thesis is dedicated to the people who have been my constant support throughout this journey.

To my parents, who have motivated me to reach every milestone in my life with their love, sacrifices, and unshakable faith in my potential. I appreciate you being a source of hope.

To my professors, especially Dr. Dalia Toqan, whose advice, knowledge, and tolerance contributed to my academic development and expanded my comprehension of my field of study.

To my brothers and sister, who have been there for me through all the highs and lows of this difficult undertaking with constant understanding, support, and encouragement.

As I embark on the next chapter of my journey, I carry with me the lessons learned, the memories cherished, and the bonds forged. This thesis is dedicated to each and every one of you who has touched my life in profound ways, reminding me that success is sweeter when shared with those we hold dear.

Immense gratitude to you all

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ABSTRACT

Association between stress, anxiety, depression, and irritable bowel syndrome (IBS) among students in a Palestinian university: A cross-sectional study

By: **Hassan Hikmat Abdalraouf Musleh**

Supervisor: Dr. Dalia Toqan

Background: Irritable bowel syndrome (IBS) is one of the most common functional gastrointestinal disorders (FGIDs) that are reported among university students and is linked to several physiological and psychological factors.

Purpose: The current study aims to investigate the pattern of IBS and depression, anxiety, and stress (DAS) and the association between them among Palestinian university students.

Methods: The study utilized a cross-sectional quantitative analytical design, in which a convenience sampling of 372 university students from 13 colleges at Arab American University of Palestine (AAUP) were recruited and filled a self-administered questionnaire containing Rome IV criteria for IBS diagnosis and Depression, Anxiety and Stress Scale (DASS-21) instruments, and were analyzed using SPSS version 27.0.

Results: 51.3% of participants were male, with a mean age of 22.6 ± 4.4 years old. Most were from medical and health sciences colleges, predominantly nursing (40.9%). A majority had no family history of IBS (73.7%). Using Rome IV criteria, the Mean IBS score was 10.96 ± 9.4, with IBS-Undefined being the most common subtype (38.7%), followed by IBS-mixed (23.0%) and IBS-constipation (22.3%). Approximately one-third showed normal levels of depression (34.7%), anxiety (30.1%),

and stress (37.9%). Significant findings included higher IBS scores among females, older students, those with a positive family history of IBS, higher caffeine consumption, and sleep disturbances ($p < 0.05$). Anxiety ($B = 0.463$, $p < 0.001$) and stress ($B = 0.365$, $p<0.001$) predicted IBS scores, with significant inter-correlations among stress, anxiety, depression, and irritable bowel syndrome scores ($p < 0.001$).

Conclusion: The current study has several points that are congruent with other international and Arabic studies in relation to most of the factors associated with IBS among university students, especially in terms of psychological factors. Further studies on a larger sample containing multiple educational institutions in Palestine are recommended.

Keywords: IBS, Irritable bowel syndrome, Stress, Anxiety, Depression, University/College students.

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Abbreviation	Full form
AIDS	Acquired immunodeficiency syndrome.
AAUP	Arab American University Palestine.
ANS	Autonomic nervous system.
BA	Bachelor's.
CNKI	China National Knowledge Infrastructure.
CBT	Cognitive-behavioral therapy.
CT	Computed tomography.
COVID-19	Coronavirus disease 2019
DASS-21	Depression, Anxiety, and Stress Scale - 21
FGIDs	Functional gastrointestinal disorders.
IRB	Institutional Review Board.
IQR	Inter Quartile range.
IBS	Irritable bowel syndrome.
IBS-M	IBS with mixed bowel habits.
IBS-U	IBS unclassified.
IBS-C	Irritable bowel syndrome constipation.
IBS-D	Irritable bowel syndrome diarrhea.
M	Mean.
MA	Master's.
MRI	Magnetic Resonance Imaging.
PSS	Perceived Stress Scale.
PTSD	Post-traumatic stress disorder.
SD	Standard Deviation.
SPSS	Statistical Package for Social Sciences.
WHO	World Health Organization.

CHAPTER ONE:

INTRODUCTION

1.1 Background

Irritable bowel syndrome (IBS) is widely recognized as a most common chronic gastrointestinal condition, characterized by recurrent stomach discomfort along with alterations in feces appearance or frequency (Alshammari et al., 2018; Priya Oka et al., 2020). It significantly affects IBS patient's physiological and psychological dimensions (Chen et al., 2021). IBS affects around 10-20% of the adult population worldwide, with a greater prevalence observed in females (Alharbi & Jahan, 2022).

The global prevalence of mental disorders exceeded 970 million people in 2019, with depression and anxiety emerging as the current conditions (Lautman & Lev-Ari, 2022). Individuals diagnosed with IBS commonly experience comorbidities, including anxiety, depression, and post-traumatic stress disorder (PTSD) (Ikechi et al., 2017). A significant proportion (50%-60%) of IBS patients were observed with psychosocial problems such as anxiety and depression (Zamani et al., 2019).

Classification of IBS

Traditionally, IBS is categorized into four distinct subtypes primarily determined by the dominant stool pattern as reported by the individual. These subtypes include IBS with constipation (IBS-C), IBS with diarrhea (IBS-D), IBS with mixed bowel habit (IBS-M), and IBS unclassified (IBS-U), which is used when the stool pattern cannot accurately classify the individual into any of the other three subtypes (Longstreth et al., 2006). The diagnosis process of IBS can be challenging as symptoms can demonstrate variations over time (Drossman et al., 2005; Palsson et al., 2012). Additionally, these

conditions have the potential to mimic various other illnesses, which makes the diagnosis process more difficult (Irvine et al., 2017; Kamp et al., 2016).

Risk Factors of IBS

The development of IBS is a multifactorial process, primarily influenced by psychological factors such as depression, anxiety, and stress (DAS). (A. K. Ibrahim et al., 2013) Found that morbid anxiety was a significant predictor of IBS, with a higher prevalence of IBS among medical students experiencing emotional stress. IBS results from a complex interplay of genetic, physiological, and psychological reactions to stress, dietary habits, age, origin, infections, and antibiotic use (Raskov et al., 2016). IBS symptoms are attributed to gastrointestinal dysmotility, hypersensitivity, immune activation, gut microbiota alterations, and changes in gut mucosal integrity (Collins & Bercik, 2009).

Gender and family history play crucial roles in IBS development, with women having a higher likelihood of experiencing IBS symptoms and those with a family history of IBS being more prone to the condition (N. K. Ibrahim, J. Bashawri, et al., 2013; L. Liu et al., 2014). Allergy and food sensitivity is also linked to IBS, as certain foods can trigger symptoms, and dietary elements, particularly fatty foods, are associated with IBS prevalence (Costanian et al., 2015). Regular exercise is associated with a reduced risk of IBS.

Sleep quality, smoking, and living arrangements are additional factors. High Pittsburgh Sleep Quality Index (PSQI) scores are linked to IBS (L. Liu et al., 2014), as is smoking (Basandra & Bajaj, 2014). Medical students living in private homes or

dorms are more likely to develop IBS (Costanian et al., 2015; N. K. Ibrahim, J. Bashawri, et al., 2013).

Definition of Depression, Anxiety, and Stress (DAS)

The World Health Organization (WHO) defines stress as a condition characterized by worry or mental tension brought on by a challenging event. Stress is a normal human reaction that motivates us to deal with problems and dangers in our lives. Everyone goes through periods of stress. However, how we handle stress significantly impacts how we feel overall (World Health Organziation, 2022).

Additionally, anxiety is defined as a sensation of tension, worried thoughts, and physical alterations like elevated blood pressure, which are all characteristics of anxiety (Corsini & Ozaki, 1994; VandenBos, 2007). Typically, intrusive thoughts or worries repeat throughout the lives of those with anxiety disorders. Fear is an appropriate, in-the-moment reaction to a recognized and precise threat, but anxiety is a long-lasting, broadly focused, future-oriented response to a diffuse threat (Newman et al., 2022).

Everyone sometimes feels sadness. However, depression is more than that. Depression is prolonged, intense sadness or sorrow, it interrupts everyday routines and may result in physical symptoms, including discomfort, weight loss or gain, irregular sleeping patterns, or a lack of energy. Additionally, those who suffer from depression may struggle to focus, feel excessively guilty or unworthy, or have frequent thoughts of death or suicide (Smirnova et al., 2018). The most prevalent mental condition is depression. Fortunately, depression is curable. Recovery may be ensured with the aid of therapy and antidepressants (Parmentier et al., 2019). Overall, DAS has distinct characteristics and can significantly impact an individual's well-being.

DAS among university students were assessed by the DASS-21 self-administered questionnaire, which encompasses a range of emotional and mental questions. The DASS-21 assesses stress by measuring the severity and frequency of stress-related symptoms. It also quantifies the degree and frequency of anxious feelings and behaviors, as well as the severity and frequency of depressive feelings and behaviors, offering insights into the presence and intensity of these emotional states in participants.

Depression, Anxiety, and Stress among University Students

The epidemiology of DAS among university students reveals a prevalent and concerning issue (Deng et al., 2022). Malaysian students, for example, displayed high percentages of these conditions, with 65.5% experiencing stress, 85.1% dealing with anxiety, and 51.4% facing depression (Fauzi et al., 2021). During the COVID-19 pandemic, research involving 44,531 individuals found high prevalence rates for stress (29.6%), anxiety (31.9%), and depression (33.7) (Salari et al., 2020).

An Egyptian study among medical students showed similar trends, with significant correlations between these mental health conditions and factors like age, gender, socioeconomic status, and region of origin. The untreated presence of these disorders can negatively impact academic performance and quality of life and even lead to suicidal thoughts (Wahed & Hassan, 2017).

Anxiety is known to be associated with functional bowel disorders like IBS. A significant link between anxiety and IBS has been observed in multiple studies (Brenneisen Mayer et al., 2016; A. K. Ibrahim et al., 2013; Mkize et al., 1998). The prevalence of IBS among university students, particularly in the context of Palestine,

remains an area of research with untapped potential. IBS is a complex condition influenced by various factors, including stress, and its impact extends to both the gastrointestinal and neurological systems, affecting affected student's overall quality of life and academic performance (Mofatteh, 2021). Understanding this association is crucial for developing effective prevention and management strategies.

1.2 Problem Statement

Various stressors, including academic pressures, social adjustments, and financial burdens, often accompany university life. In Palestine, where higher education plays a crucial role in shaping the future, a local study found that a significant and positive correlation was observed between the challenges encountered by Palestinian university students in their first year and the intensity of psychological, academic, and social stress. This implies that as the number of problems they face increases, psychological, educational, and social stress severity increases, and vice versa (Hreish & Okkeh, 2021).

The existing landscape is marked by a surge in life stressors, a trend that has propelled mental health challenges to the forefront of social concerns. Among these challenges, the prevalence of mental health issues has reached alarming proportions, notably among the youthful demographic, containing a spectrum of conditions such as DAS.

Compounding this predicament is the established correlation between these psychological adversities and IBS, a gastrointestinal disorder substantiating the bidirectional interplay of the "gut-brain axis." Although scholarly investigations that are found in the scientific literature have researched into various sides of this complex association, there remains a noticeable gap in our understanding specifically pertaining

to the prevalence and complicated inter-association of IBS and its accompanying psychological comorbidities, such as DAS, among the student body of Palestinian universities.

Consequently, an urgent need exists to address this research gap and thereby clarify the nuanced connection between psychological well-being and gastrointestinal health within this distinct cultural and academic group.

1.3 Significance of the Study

The presence of IBS has significant implications, affecting academic performance, social functioning, and overall well-being, consequently diminishing quality of life (Deng et al., 2022; Hu et al., 2021). Investigating the link between DAS and IBS among Palestinian university students addresses a crucial knowledge gap.

This research will enhance comprehension of the intricate interplay between psychological distress and physical health in the context of Palestinian students, considering socio-cultural factors. It contributes to the broader field of mental health research within university settings. By establishing this association, policymakers can develop effective strategies to enhance student's psychological and physical well-being, mitigating the negative impact on academic success, overall welfare, and quality of life.

Exploring the unique experiences of Palestinian university students with IBS offers insights into how cultural and socioeconomic factors influence the interaction between psychological and physiological aspects in developing and managing IBS. The study outcomes are invaluable for crafting strategies to aid students in managing and

preventing IBS and suggesting ways to address IBS in the Palestinian university environment.

1.4 Study Objectives

The study seeks to determine whether there is an association between IBS and DAS and tries to achieve the following objectives:

1. To estimate the prevalence of DAS among students enrolled at AAUP.
2. To estimate the prevalence of IBS among students enrolled at AAUP.
3. To evaluate the association between DAS and IBS among students enrolled at AAUP.
4. To identify potential risk factors associated with developing IBS among students enrolled at AAUP.
5. To analyze the association between demographic data and the occurrence of IBS and DAS among students enrolled at AAUP.

1.5 Study Questions

The current study tries to answer the following questions:

1. What is the prevalence of DAS among students enrolled at AAUP?
2. What is the prevalence of IBS among students enrolled at AAUP?
3. Is there a significant association between DAS and IBS among students enrolled at AAUP?
4. What potential risk factors are associated with developing IBS among students enrolled at AAUP?

5. Is there an association between demographic data and the occurrence of IBS and DAS among students enrolled at AAUP?

1.6 Study Hypotheses

The current study tries to test the following hypotheses:

H1: There are statistically significant differences at ($\alpha \leq 0.05$) in the prevalence of DAS among students enrolled at AAUP.

H1: There are statistically significant differences at ($\alpha \leq 0.05$) in the prevalence of IBS among students enrolled at AAUP.

H1: There are statistically significant differences at ($\alpha \leq 0.05$) in the association between DAS and IBS among students enrolled at AAUP.

H1: There are statistically significant differences at ($\alpha \leq 0.05$) in the potential risk factors associated with developing IBS among students enrolled at AAUP.

H1: There are statistically significant differences at ($\alpha \leq 0.05$) in the association between demographic data and the occurrence of IBS and DAS among students enrolled at AAUP.

1.7 Theoretical and Conceptual Framework

The following theoretical framework provides a foundation for understanding the association between various research study variables. Several theoretical perspectives may be taken into consideration for this thesis. In this case, the biopsychosocial model and stress-coping theory served as the study's foundation.

1.8 Operational Definition

The following operational definitions provide clear guidelines on how each study variable is measured.

The socio-demographic section included twelve questions developed by the researcher. Participants were asked to indicate their gender, age, university facility, study year, years of experience, living area, smoking, IBS family history, fast food consumption, caffeine consumption, and chronic conditions.

The assessment of stress, anxiety, and depression was performed using the Arabic version of the Depression, Anxiety, and Stress Scale (DASS-21). Participants responded to 7 items for each subscale, the responses ranged from 0 (does not apply) to 3 (applies most of the time). while irritable bowel syndrome was determined based on the ROME IV criteria. consisted of 6 items, where the majority of responses ranged from 0 = never to 10 = always.

1.9 Biopsychosocial Model

It is a comprehensive approach that considers how biological, psychological, and social elements interact to affect a person's health and well-being (Engel, 1977). This paradigm is essential for understanding how DAS and IBS are related among college students. The biological factors include factors that may lead to IBS in students and how it is related to DAS, such as gender, age, and family history of IBS. In contrast, psychological factors investigate the psychological processes that affect DAS and the onset or exacerbation of IBS in students interact. Psychological aspects include consuming caffeinated beverages, physical activity, and sleep quality. Lastly, social factors investigate the impact of social factors on how students feel about DAS and IBS,

including the faculty the student enrolled in, academic year, living conditions, smoking status, and consuming junk food.

1.10 Stress-Coping Theory

Understanding student's coping mechanisms for DAS could help better understand their susceptibility to IBS. This includes Lazarus and Folkman's Transactional Model, which investigates how students evaluate and manage stressors linked to their personal, social, and academic lives. It also investigates whether specific coping strategies (e.g., problem-focused coping, emotion-focused coping) are associated with a higher risk of developing IBS (Lazarus & Folkman, 1984). It also includes the Integration of Theoretical Perspectives, which involves understanding the intricate association between DAS and IBS among Palestinian university students. It could benefit from combining the biopsychosocial model with stress-coping theories. It is possible to explore associations and potential predictors of IBS among the student population using a cross-sectional study design to gather data on these factors at a particular period.

The results of this study may be utilized in the development of specific management to promote student's mental and physical health, which decreases the incidence of IBS and its impact on academic performance and general quality of life.

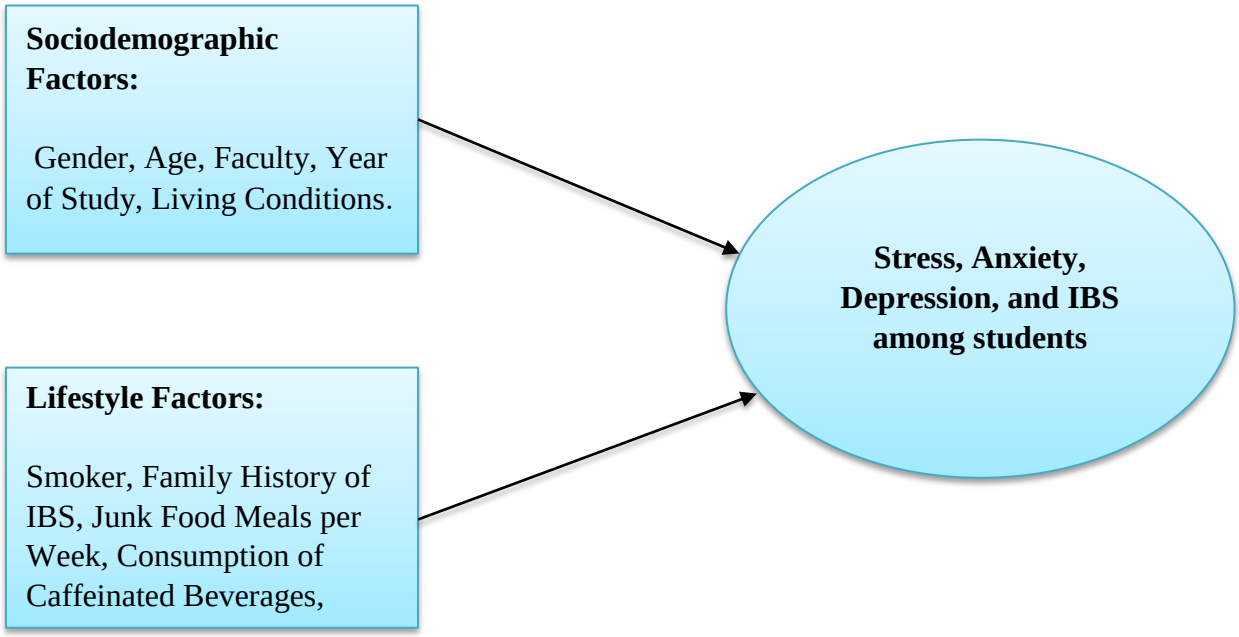


Figure 1.1: Conceptual framework of the current study. Sociodemographic and lifestyle factors were considered independent variables, while depression, anxiety, stress (DAS), and irritable bowel syndrome (IBS) were considered dependent variables.

CHAPTER TWO:

LITERATURE REVIEW

2.1 Introduction

The following literature review was conducted to grasp an overall view of the latest and most related scientific work regarding the association between IBS and DAS among university students and the most common related factors. The search of articles was done in three scientific databases: EBSCO (Web of Science), Scopus (Elsevier) and PubMed (National Library of Medicine), using the following keywords with the Boolean operators: (irritable bowel syndrome OR IBS OR functional gastrointestinal disorder OR FGID), (depression OR anxiety OR stress OR psychological OR psychiatric), (university OR college OR undergraduate students), and the full, peer-reviewed English articles that were published in the last ten years were selected to be reviewed in this section.

Systematic reviews have been conducted to investigate what rigorous studies have added to the literature related to the association between the most common psychological disorders (DAS) and having IBS. IBS is a prevalent functional gastrointestinal illness, with a prevalence rate ranging from 5% to 10% among the general population (Ford et al., 2020; Priya Oka et al., 2020; Sperber et al., 2021). The diagnosis of this condition is established by using symptom-based criteria, which were first proposed by the Rome Foundation in 1990 (Drossman et al., 1990). Characterized by discomfort in the abdominal region, the condition manifests as pain and is often accompanied by alterations in the consistency or frequency of bowel movements.

The etiology of this condition is not yet fully understood. Still, numerous factors have been suggested, such as motility disruptions, heightened sensitivity of the internal organs, changes in the mucosal barrier and immunological function, alterations in gut microbiota, and processing throughout the central nervous system (Holtmann et al., 2016). However, it is well acknowledged that the influence of emotions and psychological well-being is significant in the development and duration of symptoms associated with IBS (Jones et al., 2017; Koloski et al., 2016; Koloski et al., 2006; Koloski et al., 2012). The Rome Foundation has redefined IBS as a condition characterized by the intricate and multifaceted interplay between the stomach and the brain (Christopher J Black et al., 2020; Olafur S Palsson et al., 2016).

2.2 Epidemiology of IBS

The prevalence of IBS varies in different countries. According to a pooled analysis, the worldwide prevalence of the disease is 11.2% (Ford et al., 2017). On the other hand, the mentioned systematic review and meta-analysis of the worldwide prevalence of IBS is based on data obtained from 57 studies, including 92 study populations from 42 distinct countries, involving more than 400,000 participants, determined that the occurrence of IBS was 9.2%, ranging from 7.6% to 10.8% when classified based on the Rome III criteria and 3.8%, ranging from 3.1% to 4.5% when classified based on the Rome IV criteria. The prevalence of the condition exhibited significant variation across different countries.

India reported the lowest prevalence at 0.2%, while Croatia reported the highest prevalence at 29.2%. Substantial variations in the occurrence rates were also observed based on the type of survey instrument employed and the method of survey

administration. The findings highlight the necessity of uniform diagnostic criteria and a consistent administration of questionnaires to enhance comparability across research studies (Black & Ford, 2020).

Figure 2.1: The global prevalence of irritable bowel syndrome according to the Rome IV criteria (Black & Ford, 2020).

More data on the prevalence of IBS in the Middle Eastern region needs to be collected. A study conducted in Palestine that especially focused on the West Bank region reported an IBS prevalence of 30%, taking into consideration that the study is population-based and includes cities, rural areas, and refugee camps. The finding is somewhat higher than worldwide and Western populations and increased in individuals residing in non-urban areas (villages or refugee camps) compared with urban areas (Qumseya et al., 2013). According to research conducted on the Saudi population, the percentage of individuals who reported experiencing IBS symptoms was 26%. Only 7.9% of the 26% who reported being diagnosed with IBS fulfilled the Rome IV criteria (Amin et al., 2021).

The prevalence of IBS among Egyptian university students was 31.7%, with a greater incidence among females and those with a positive family history of IBS (Elhosseiny et al., 2019b). Similarly, the first research on the prevalence and related factors of IBS in a group of Jordanian medical students included over 1,000 Jordanian university students aged 18 to 24 years. The total prevalence of IBS in the research group was 30.9%, significantly higher than in Western populations (Jadallah et al., 2022).

2.2.1 Diagnosis and Treatment of IBS

The diagnosis of IBS is usually based on the positive detection of symptoms that relate to several different syndromes linked to diseases, such as IBS diarrhea, IBS constipation, functional bloating, prolonged functional stomach pain, functional constipation, or functional diarrhea (Camilleri, 2021). The lack of a definitive diagnostic test or biomarker for IBS has led to the development of symptom-based diagnostic criteria, such as the Rome criteria. These criteria were established through consensus among experts to promote a standardized diagnosis and reduce the need for excessive investigations (Ford et al., 2008). The criteria have evolved, with the Rome III criteria implemented in 2006 (Longstreth et al., 2006). In 2016, the Rome criteria were updated with the IV criteria (Mearin et al., 2016).

The Rome Committee has recently modified the criteria for diagnosing IBS; changes are worth noting. Mainly, the committee has eliminated abdominal discomfort from the definition and increased the frequency of abdominal pain required to meet the criteria for IBS from a minimum of three days per month to at least one day per week. Therefore, the Rome IV criteria are stricter than their previous tool, resulting in

fewer patients who self-diagnose with IBS meeting the diagnostic criteria for the condition. However, those who still meet the criteria exhibit more severe symptoms and greater levels of psychological co-morbidity (C. J. Black et al., 2020).

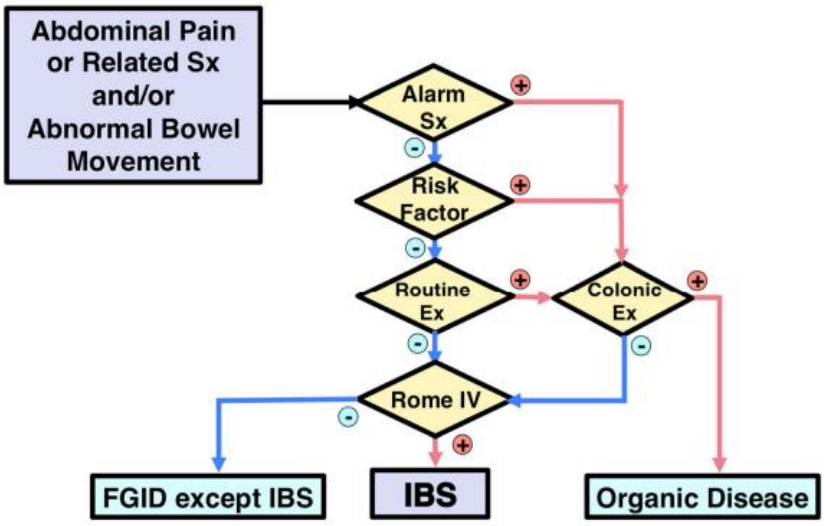


Figure 2.2: IBS Diagnostics Algorithm. FGID = Functional Gastrointestinal Disorder, IBS = Irritable Bowel Disorder. Check the diamond for yes or no. Bloody stool, weight loss above 3 kg in 6 months, fever, and arthralgia are warning signs. Alarm signs include digestive fluctuation, palpable lump, or blood on the examining gloved finger on a digital rectal examination. Risk factors include age over 50, prior or family history of organic colorectal illnesses, and the necessity of colonic studies (Fukudo et al., 2021).

For an accurate diagnosis, the rules cannot eliminate unanticipated organic disorders. Clinical circumstances include gastrointestinal mucosal biopsy, upper gastrointestinal endoscopy, barium enema, upper gastrointestinal series, abdominal ultrasonography, fecal ova test, stool bacterial culture, abdominal computed tomography (CT), computed tomographic colonography, abdominal magnetic resonance imaging (MRI), small intestinal endoscopy, small intestinal fluoroscopy, lactose tolerance test,

and hydrogen breath test. IBS is diagnosed if clinical exams are negative and Rome IV criteria are positive. Other FGIDs may be diagnosed if Rome IV criteria for IBS are negative (Fukudo et al., 2021).

The management of IBS is an integrative strategy that involves adjustments to one's lifestyle, administration of pharmaceutical interventions, and utilization of alternative medicine treatments (Camilleri, 2021). The initial pharmacological interventions include spasmolytic or antispasmodic medications, fiber from diet supplementation, and the administration of laxatives using alternative medicine, including the combination of acupuncture and Chinese herbal therapy, which may have therapeutic benefits in treating IBS. Moreover, cognitive-behavioral therapy (CBT) and patient-centered short-term CBT using web-based or telephone-based modalities have demonstrated potential efficacy in treating patients with psychological comorbidity (Camilleri, 2021). However, the effectiveness of interventions targeting these illnesses upon identification must be more adequately supported by significant evidence from extensive trials.

2.2.2 Epidemiology of Depression, Anxiety, and Stress

University students learning and academic performance are negatively impacted by DAS (Deng et al., 2022). A study of 449 Malaysian students found that 65.5% experienced stress, 85.1% anxiety, and 51.4% depression. The majority of cases are stress (74.6%), depression (66.2%), and anxiety (74.6%) were of a normal-to-mild intensity, whereas anxiety (74.6%) was of a moderate-to-severe intensity. The year of study and the stress score were statistically significantly associated. Poor sleep and fatigue were risk factors for anxiety and depression in the regression analysis (Fauzi et

al., 2021). A systematic review and meta-analysis done during the COVID-19 pandemic on 14 research with a sample size of 44,531 people found that the prevalence of stress was 29.6%. In contrast, the prevalence of anxiety was found to be 31.9%, and the prevalence of depression was found to be 33.7% (Salari et al., 2020).

Locally, according to a survey done on 442 medical students, there were 62.4%, 64.3%, and 60.8% of those who reported having stress, anxiety, or depression, respectively, with varying degrees. Significant correlations were found between higher stress and anxiety scores and females and older age, while increased age, poor socioeconomic standards, and among students from different governorates were all related to higher depression scores (Wahed & Hassan, 2017).

2.2.3 Depression, Anxiety, and Stress among University Students

Students represent society's future investment. Their mental health and wellness are significant not just in and of themselves but also as an indicator of the community's general well-being (Kumaraswamy, 2013). It is widely acknowledged that university undergraduate students in developed and developing nations frequently experience DAS due to Student's diverse socioeconomic backgrounds; joining universities might create a range of risk factors for their mental health (Mofatteh, 2021).

Several psychological and psychiatric studies carried out in both developed and developing nations over the last several decades have shown that university students are more likely than the general population to experience DAS (Brenneisen Mayer et al., 2016; A. K. Ibrahim et al., 2013; Mkize et al., 1998). It is well known that DAS is a multidimensional issue with personal, health, social, and professional problems that may, directly and indirectly, affect one's quality of life (Ivandic et al., 2017).

Untreated mental disorders can make students anxious and, as a result, have a negative impact on their quality of life and academic performance. Examples include lower academic performance, less empathetic behavior, unstable associations, low self-confidence, and suicidal thoughts (Ip et al., 2016; January et al., 2018; Whitton & Whisman, 2010).

The obvious symptoms of DAS may take various forms. Still, more common ones include poor hygiene, apathy (lack of interest and enthusiasm), difficulties with concentration, and appetite loss (Mofatteh, 2021). Better awareness of DAS among students in developed and developing nations not only helps governments, educational institutions, families, and healthcare organizations in identifying risk factors linked to mental health issues to reduce such risk factors but also gives them a chance to examine how these factors have changed in the academic setting (Mofatteh, 2021).

Anxiety is one of several psychiatric diseases known to be associated with functional bowel disorders (Folks, 2004; Hausteiner-Wiehle & Henningsen, 2014). The findings of this research also show a significant link between anxiety and IBS. Numerous studies carried out worldwide have also shown that people with IBS and high anxiety levels have a higher incidence of IBS symptoms than their peers (N. K. Ibrahim, W. F. Battarjee, et al., 2013; Naeem et al., 2012; Shen et al., 2009; Thompson, 2006).

A current lack of knowledge regarding the prevalence of IBS among university students is a critical gap in the existing academic literature, including Palestine. However, a systematic review and meta-analysis revealed that the combined prevalence of IBS in 53 studies using the Rome III criteria, conducted across 38 countries and

involving a total of over 395,000 participants, was estimated to be 9.2% (P. Oka et al., 2020). Furthermore, according to the latest study published in Jordan in 2022, the overall prevalence of IBS was 30.9%, a significantly more significant percentage than the reported rates in Western populations (Jadallah et al., 2022).

In addition to the physical manifestations, increasing evidence indicates that psychological variables are associated with IBS. Research has shown that psychological factors like DAS are associated with IBS (Farzaneh et al., 2012; Hausteiner-Wiehle & Henningsen, 2014; Hu et al., 2021; Zamani et al., 2019). Patients with IBS are more likely to experience symptoms of anxiety and depression compared to their healthy counterparts (Hu et al., 2021; Zamani et al., 2019). A recent study by Alaa Adel et al. (2021) found that patients with IBS reported experiencing varying degrees of anxiety and depression. In contrast, most non-IBS participants reported only mild anxiety and depression.

A growing body of clinical and experimental evidence has demonstrated that IBS is a complex condition characterized by an interaction between irritable bowel and an irritable brain (Qin et al., 2014). IBS pathology increasingly involves unusual functions of the enteric, autonomic, and/or central neurological systems due to disruption of the bidirectional brain-gut axis (Karantanos et al., 2010). Stress can interfere with brain-gut connections and gastrointestinal tract physiological functioning by overactivation of the hypothalamic-pituitary-adrenal (HPA) axis, autonomic nervous (ANS), metabolic, and immunological systems (Jelsness-Jørgensen et al., 2012; Konturek et al., 2011; Larauche et al., 2012).

IBS can significantly impact academic performance, social functioning, and overall well-being, reducing the quality of life (Deng et al., 2022; Hu et al., 2021). Understanding this association can aid in developing effective prevention and management measures.

2.2.4 Association between IBS and Stress, anxiety, depression

A systematic review and meta-analysis were conducted on a total of 11 prospective cohort, and case-control studies were conducted on population-based or gastroenteritis cohorts to investigate whether depression and anxiety can predict the development of IBS and the relative risk (RR) of such an association. In conclusion, the studies were pooled to a result of 2 folds of developing IBS among participants who have anxiety (RR = 2.38, 95% confidence interval (CI) = 1.58 – 3.60) or depression (RR = 2.06, 95% CI = 1.44 – 2.96). Moreover, stronger associations were found among participants with a history or current gastrointestinal infection. At the same time, the researchers reported that such results may be limited by the differences in methodological approaches of each reviewed and analyzed study (Sibelli et al., 2016).

Another systematic review found similar results, which was conducted by (Nahla Khamis Ibrahim, 2016) on a total of 16 articles but focused more on the proportion of medical university students and found that the prevalence of IBS ranged from 9.3% to 35.5%, with significantly higher IBS prevalence among female students, as well as students with positive family history of IBS, who were found to have depressive, stress and/or anxiety scores, current infections, and sleep disturbances. This review is less rigorous than the previous one because no meta-analysis was done.

Another systematic review and meta-analysis was conducted in China by (Yang et al., 2022a) to investigate the prevalence and associated factors of IBS among university students and was selected to be reviewed in the current chapter because it contained a larger number of databases, including CNKI (the China National Knowledge Infrastructure), with 22 cross-sectional studies in their review, 14 of which are in Chinese language containing more than 33,000 students, giving a broader overview of the topic among students of other nationalities. Regarding the prevalence, The review compared the prevalence of IBS across different Rome criteria versions, resulting in rates of 10.50%, 12.00%, and 3.66% for the second, third, and fourth versions, respectively, with an overall pooled prevalence of 11.89%. Notably, higher pooled prevalence rates were observed among postgraduate students (12.74%) compared to undergraduates (12.14%) and juniors (8.18%), as well as among females (13.14%) compared to males (10.17%). Earlier survey years (2005-2010) showed higher rates (14.42%) compared to more recent years (2010-2021) at 10.60%. IBS prevalence was also elevated in students with anxiety, depression, drinking habits, and smoking. However, none of these factors significantly predicted IBS in regression analysis.

It was found that noticeable percentage of studies that were conducted in relation to the current study's topic were conducted among students of the medical field (medicine and health sciences), which is thought to be related to two main reasons: first is associated with the notion that medical and health sciences students face unique challenges related to their curriculum, and second, is the higher cooperation and comprehension of the scientific research of topics related to physiological disorders, and their connection with psychological disorders (Mass-Hernández et al., 2022).

A good example of studies related to what was previously mentioned is the cross-sectional study of (Elhosseiny et al., 2019a) on a sample of 382 medical students in a university in Egypt who completed a Rome III criteria of IBS diagnosis questionnaires, as well as the Arabic version of Hospital Anxiety and Depression Scale (HADS). The study revealed a 31.7% prevalence of IBS among university students. Notably, male students (55.4%) had a significantly higher IBS rate compared to female students (33.6%), and senior students (54.5%) had a higher prevalence than juniors (45.5%). Students with a positive family history of IBS also showed a greater IBS rate (66.1%). Regular exercise was associated with a lower IBS prevalence (28.1%) compared to those who did not exercise (71.9%). Other lifestyle-related factors, such as sleep hours, smoking, and dietary habits, did not significantly correlate with IBS. Additionally, higher IBS rates were observed among students with abnormal anxiety scores (41.3%) and those reporting childhood traumatic events (69.4%). Depression scores did not significantly impact IBS diagnosis.

A similar methodological approach was used in the Saudi study of (Meshal Khaled Alaqeel et al., 2017) among a convenient sample of 270 medical students, who were asked to complete a self-administered questionnaire that contained the Rome III IBS diagnostic criteria and DASS-21 tool, focusing on the prevalence of anxiety. Results found a prevalence of IBS equal to 21%, with 39.2% and 26.1% of them having normal and moderate anxiety classifications, respectively. Significantly higher percentages of IBS were found among females (25.9%) than male students (18.6%), as well as among students who have anxiety. In contrast, no significant association between academic level and IBS was found. The study was limited by the investigation of only two demographic characteristics (gender and academic level) and one of the

three domains of the DASS-21 instrument (anxiety), but this can be related to the fact that this article was extracted from a research course project.

In comparison, A Saudi study involving 890 university students implemented the Rome IV criteria and discovered an 8.8% prevalence of IBS. This aligns with prior research indicating lower IBS rates with the fourth Rome version compared to the third. IBS was significantly more prevalent among students in scientific colleges (16.5%) than in medical (7.9%) and humanities colleges (3.4%). Students living on campus had a higher IBS prevalence (26.7%) compared to those in rented apartments (9.4%) or with their families (7.6%). Notably, IBS was more common among regular smokers (21.5%), those with food intolerance, travel-related diarrhea, a 1st-degree relative diagnosed with IBS, and recent emotional stress. Interestingly, there were no significant differences in IBS prevalence concerning anxiety and depression scores. The study concluded that the absence of a significant link between psychiatric disorders and IBS could guide new management approaches. The need for further studies using Rome IV criteria to explore this association was emphasized. College type was a substantial predictor, with medical and scientific colleges having higher odds compared to humanities colleges, along with significant odds for smokers, individuals with food intolerance, and those reporting recent emotional stress (Hakami et al., 2019b).

Similar student's sociodemographic characteristics were also investigated by a Lebanese study of a sample of 813 university students to explore their association with IBS. They used Rome III criteria, which resulted in a prevalence of 20%, mainly with the subtypes of IBS-M (44.8%) and IBS-C (36.8%). The researchers used a self-administered questionnaire to investigate the characteristics related to IBS, which found

that significantly higher proportions of IBS were found among female students (25.0%) than male students (12.6%, OR = 2.23, $p < 0.001$), older students ($p = 0.039$), who live in dorm or private house (29.7%) than who live with family (14.5%, OR = 2.49, $p < 0.001$), and having no regular physical activity habits (23.8% vs 14.7%, OR = 1.81, $p = 0.001$), while smoking and faculty were not significantly related to the diagnosis of IBS. The study was strengthened by the heterogeneity of students (public and private universities), while it was limited by a non-probability sampling method and not controlling confounders (Costanian et al., 2015).

Various tools can be employed to investigate psychological issues among university students and their association with the prevalence of IBS, focusing on enhancing the accuracy and reliability of results. For instance, a cross-sectional study in China with more than 1800 female university students used the Perceived Stress Scale (PSS) and the World Health Organization's Quality of Life questionnaire (WHOQOL-BREF) for stress assessment and physical activity evaluation, respectively.

The study revealed a 10.1% IBS prevalence among female students, with higher rates in the College of Nursing (4.0%) compared to the College of Human Sciences (3.4%) and the College of Medical Technology (2.7%). The IBS subtypes included IBS-M (50%), IBS-C (23.3%), IBS-D (16.1%), and IBS-U (9.8%), with the majority experiencing moderate (45.2%) or mild (38.9%) IBS. Significantly higher proportions of IBS were found among students reporting dysmenorrhea, food avoidance, regular GI medication and traditional Chinese medicine use, and increased class absenteeism. Higher stress scores were observed in students with IBS, and lower quality of life

scores, particularly in the physical activity domain, were associated with a 13% higher likelihood of IBS presence using a regression model. (Chen et al., 2021).

Rather than the use of HADS and Rome III instruments, another cross-sectional study on a sample of 190 Malaysian medical university students utilized the tool of Pittsburg Sleep Quality Index (PSQI) to investigate the impact of sleep quality and disturbances as one of the factors affecting the prevalence of IBS. The study found that the prevalence of IBS among medical students was 14.7%, which was higher among male students (16.9%) and students with depression (26.3%), anxiety (19.2%), and poor sleep quality (17.2%), and significantly predicted by depression ($p < 0.001$), in which students who had depression had 4.75 odds of having IBS than non-depressive students, while anxiety ($p = 0.145$), gender ($p = 0.466$), ethnicity ($p = 0.852$), sleep quality ($p = 0.295$) and academic year ($p = 0.558$) did not significantly predict IBS. The study also cited previous studies to compare the prevalence of IBS and found that it was higher than other medical students in Asian countries but lower than in Western countries (Seger et al., 2020).

In a French study focusing on mental health, eating disorders, and IBS among university students, a comprehensive approach was employed. This cross-sectional study examined 731 university students and utilized specific assessment tools for various variables, such as the Duke Score for depression, Cohen Score for stress, Rome III for IBS, Maslach Inventory for emotional exhaustion, Insomnia Severity Index, and Internet Addiction Test for cyberaddiction.

The study revealed a higher prevalence of eating disorders (16.7%) compared to IBS (7.8%), with 2.7% of students experiencing both conditions. IBS was more

common among older students, females, those in advanced academic years, and those facing financial difficulties. Students with IBS had significantly higher mean scores for depression, anxiety, and stress compared to non-IBS students. Additionally, higher rates of emotional exhaustion, clinical insomnia, and cyberaddiction were observed among IBS-affected students. DAS, cyberaddiction, and emotional exhaustion were identified as significant predictors of IBS. The study emphasized the importance of early emotional health interventions, particularly for students with eating disorders and IBS (Spillebout et al., 2019).

The current review suggests that the prevalence of IBS among university students is worth noticing and needs early management. Also, despite the use of different instruments to assess for several factors associated with IBS, like DAS as well as other sociodemographic and health-related characteristics, there still is a unified pattern related to the significantly related and predicting variables of IBS, which is also seen even when a newer version of Rome criteria was used, which in general yielded lower prevalence rates of IBS In most of the studies that have used them.

CHAPTER THREE:

METHODS

3.1 Introduction

The methodology chapter presents an overview of the research design, including the study design and setting. It outlines the study population, sample size, sampling frame, and method. The chapter also explains the instruments employed for data collection and the design of the questionnaire. It also discusses the data collection period and defines the variables, distinguishing between independent and dependent ones. The pilot study and data collection, management, and analysis procedures are described. Ethical considerations are additionally addressed in this chapter.

3.2 Study Design

This study employed a cross-sectional descriptive research design to investigate the prevalence of DAS and IBS among students and their associations at Arab American University of Palestine (AAUP). The design was chosen because it is time- and cost-effective, where the researcher was able to collect the data at a single time point from each student, without the need for further follow-up, as it is suitability for prevalence studying, because it allows the researcher to collect data related to multiple variables and exposures at a single time point, and allows the investigation for the associations between them in a numerical way. It is also a resource-friendly design and suitable for limited resources, time, or participant access since data is collected without disturbing the study environment; it minimizes disruptions and facilitates smooth data collection (Belbasis & Bellou, 2018; Mellis, 2020).

3.3 Site and Setting

The study was conducted at the Arab American University of Palestine (AAUP), targeting all students in university faculties at both campuses in Jenin and Ramallah Governorate in the State of Palestine. The AAUP is the first private university in Palestine, established in 2000. It offers a wide range of academic programs, including over 80 bachelor's (BA) programs and over 110 postgraduate programs, including high diploma, Master's (MA), and Doctor of Philosophy (Ph.D.) degrees, at both campuses in Jenin and Ramallah Governorate in the State of Palestine. Making it a prominent and diverse educational institution in Palestine. Therefore, this site is suitable for the conduction of the current study.

3.4 Study Population

This study focused on students currently enrolled at the Arab American University of Palestine (AAUP) on both campuses. The representative sample population included students from various colleges, comprising 11,051 students divided into 10,099 undergraduate and 952 postgraduate students, distributed over 13 colleges. The study was conducted across both university campuses, including Jenin and Ramallah Campus.

3.5 Sample Size and Sampling

The sample size for the study was calculated using (Raosoft Inc.) software, as illustrated in Appendix E. The software recommended a sample size of 372 students, ensuring a 95% confidence level and a 5% margin of error. Thorough consideration went into determining this sample size, ensuring its adequacy to achieve the study's objectives with high confidence and accuracy.

The study employed a convenient sampling method; the research tried to guarantee that the chosen sample accurately reflects the university population. A more thorough understanding of the association between DAS and IBS among students at the AAUP is made possible by this method. Unfortunately, randomization was very limited due to online-based learning during the data collection period because of current political situations; the data was collected via an online questionnaire organized by student affairs.

3.6 Inclusion and Exclusion Criteria

The inclusion criteria for participants were restricted to those currently enrolled at AAUP. The exclusion criteria included a previous diagnosis of inflammatory bowel disease, renal failure, malabsorption, neuropathy, thyroid disease, parasitic or bacterial infection, endometriosis, intestinal tumors, postsurgical syndromes, AIDS, diabetes mellitus, chronic pancreatitis, psychiatric disorders, organic and allergic colitis, lactose intolerance, pseudo-obstruction, myopathy, symptomatic biliary dysfunction or lithiasis.

3.7 Data Collection Tools and Procedures

This research used three tools with different functions: firstly, sociodemographic information; secondly, the Rome IV diagnostic questionnaire; and thirdly, the Depression, Anxiety, and Stress Scale 21 (DASS-21).

The first module, designed for adult participants and focused on IBS, was based on the well-known Rome IV diagnostic questionnaire, which was selected since it is crucial to determining IBS-related symptoms in the target group. Furthermore, the Depression, Anxiety, and Stress Scale 21 (DASS-21), a generally well-recognized instrument for accurately evaluating DAS levels, served as the study's second module.

After obtaining the Institutional Review Board (IRB) approval from AAUP, the researcher contacted the postgraduate Dean's Secretary and met all the criteria to collect data from university students, including postgraduate students, via an online questionnaire, The Research facilitation Request listed in Appendix D. The students filled out the questionnaire via an online link from their university email; they were cooperative, allowing the researcher to collect the data in a shorter timeframe. The study questionnaire is included in Appendix A.

The use of the Google Form online questionnaire was necessitated by the existing political circumstances in the whole country, which caused the student unable to physically access the institution due to the closure of roads.

The researcher also explained the study's objectives to the students on the first page of the questionnaire to ensure their understanding. Before filling out the questionnaire, each participating student was required to sign an informed consent form. The study's success can be partly attributed to the researcher's thorough approach to data collection. Also, the researcher ensured the study was conducted ethically and with a thorough understanding of the importance of scientific research and the significance of this research topic. The data collection period started in October 2023 and continued until November 2023.

3.8 Validity and Reliability

The use of internal consistency for Rome IV is impossible due to the inclusion of items not on a Likert scale and the presence of uninformed questions. The DASS-21 scale had a high level of internal consistency, as shown by an overall Cronbach's alpha coefficient of 0.946. Furthermore, each subscale demonstrated high reliability, with the

stress subscale scoring 0.922, the anxiety subscale scoring 0.870, and the depression subscale scoring 0.919.

DASS-21 Instrument

The Depression Anxiety Stress Scale (DASS) is a widely used tool developed by (Lovibond, 1995) for measuring DAS. The DASS is a self-report tool designed to assess unique and independent aspects of DAS and identify the commonalities between anxiety and depression (Norton, 2007). The Depression Anxiety Stress Scales (DASS) are divided into three subscales (stress, anxiety, and depression) with seven questions for each and available in two versions: the 42-item version and the 21-item version; the 21-item version was used in the current study for time efficiency and less burden on the students. The tool license consent agreement is listed in Appendix C.

IBS Instrument

The development of the Rome method and its categorization system provided the foundation for a remarkable increase in scientific inquiry and validated the patient's experience of these symptoms (Thompson, 2006).

The Rome IV Diagnostic Surveys were designed to assess the symptoms of IBS as a comprehensive instrument that provides inclusion criteria for clinical research, serves as a differential diagnosis in epidemiological surveys, and assists in making preliminary diagnoses by healthcare professionals. Various surveys were created for children, adults, and teenagers, as well as infants and toddlers (O. S. Palsson et al., 2016). This instrument converts the Rome IV diagnostic criteria into questions easily comprehended and answered by patients and research participants.

IBS is diagnosed based on specific criteria, including Recurrent abdominal pain, occurring at least once a week on average over the last three months, with two or more abnormal defecations, Association with a change in stool frequency, Association with a change in the appearance of stool. It is essential that these criteria are met consistently over the last three months, and the onset of symptoms should have occurred at least six months before the diagnosis.

3.9 Study Variables

The independent variables of the current study included student's sociodemographic (gender, age, faculty, academic year, living conditions) and lifestyle (smoking, family history of IBS, junk food and caffeinated beverages consumption, sports performing, and sleep disturbances) factors. In contrast, the dependent variables included the scores of IBS and DASS-21 instruments, whereas the subscales of the DASS-21 instrument served as independent variables for their association with IBS.

3.10 Pilot Study

The pilot study involved 50 participants who were given a clear explanation of the study's objectives. The purpose was to gather feedback on the questionnaire especially the socio-demographic questions, including the participant's opinions, difficulties encountered, and the average time it took to complete. Participants found the questionnaire to be clear and offered minimal comments, which were taken into consideration. On average, they took 10-15 minutes to complete the questionnaire. The participants were excluded from the final study.

3.11 Data Management and Analysis

The soft copy data was filled in an Excel document directly since the Google Form of the questionnaire was linked to an Excel sheet during the data collection. After which, all of these data were entirely deleted from Excel. The variables were coded and transferred to analysis software, preceded by data sheets being checked for missing and duplicate data. Further descriptive and inferential analyses were carried out to answer the specific objectives of this research.

The Statistical Package for Social Sciences (SPSS) version 27 was used for the study's statistical analysis, and descriptive statistics were used to determine the parameter's frequency distributions, means, and standard deviations, including student's demographic and lifestyle variables, as well as their responses to and scores of the IBS and DASS-21 instruments. The associations between the variables were also evaluated using inferential statistics, using the suitable inferential tests, which included Mann-Whitney U and Kruskal-Wallis tests to investigate the differences in mean ranks of IBS and DASS-21 scores among the different categories of student's demographic variables, as well as Spearman correlation test to find the strength and direction of the correlation between student's age and IBS and DASS-21 scores, as well as between DASS-21 subscales and IBS score. Lastly, a linear regression model was built to predict IBS scores from the scores of DASS-21 subscales, considering that non-parametric tests were used as the data distribution was abnormal.

3.12 Ethical Considerations

Before conducting this study, the researcher ensured that ethical considerations were met by obtaining approval from the Institutional Review Board (IRB) of AAUP, which is listed in Appendix B. Each participant was given a consent form and a clear explanation of the study's purpose and methodology. The researcher emphasized that participation was voluntary and ensured their anonymity.

To further protect their privacy, all data was kept confidential and used solely for the study's purposes. The researcher clarified to all participants that declining participation would have no negative consequences or harm. Additionally, participants were allowed to withdraw at any time during the study, emphasizing that students do not need to declare any specific reasons for withdrawal.

CHAPTER FOUR:

RESULTS

Introduction

This chapter includes the descriptive and analytical results of the current study, where descriptive results have the frequencies and percentages of participant's categorical demographic variables, as well as the responses to the IBS and SAD scale's items, in addition to means and standard deviations of their scale demographic variables and the overall scale's scores. In contrast, analytical results show the investigations of the association between the study's independent and dependent variables to answer its questions and test its hypotheses.

Part 1: Demographic Data of the Students

Table 4.1 outlines student's demographic information, emphasizing the most significant percentages for each variable. The gender distribution showcases 51.3% male and 48.7% female students, with a median age of 22, ranging from 18 to 50. Among faculties, Nursing is prominent at 40.9%, followed by Dentistry at 12.6%, while in terms of academic year, the fourth year constitutes the most significant segment at 31.5%. Regarding living conditions, the majority (70.2%) live with their families, while when asked about health, 72.8% do not smoke, and 55.9% report sleep disturbances. For dietary habits, 63.4% consume junk food 1-2 times per week, compared to caffeinated beverage consumption, which varies, with 37.4% constantly consuming them. Lastly, 80.4% of students do not engage in regular sports.

Table 4.1: Distribution of student's demographic data

Variable	Values	Frequency	Percentage
Gender	Male	191	51.3%
	Female	181	48.7%
Age	Median (IQR, min-max)	22.0 (3, 18 – 50)	
Faculty	Engineering and Information Technology	41	11.0%
	Nursing	152	40.9%
	Medicine	25	6.7%
	Allied Medical Sciences	35	9.4%
	Sciences	6	1.6%
	Modern Sciences	5	1.3%
	Law	10	2.7%
	Dentistry	47	12.6%
	Administrative and Financial Sciences	14	3.8%
	Graduate Studies	11	3.0%
	Sport Sciences	11	3.0%
	Modern Media	10	2.7%
	Arts	5	1.3%
Academic year	First-year	53	14.2%
	Second year	60	16.1%
	Third year	93	25.0%
	Fourth-year	117	31.5%
	Fifth year or more	49	13.2%
Living condition	Alone	65	17.5%
	With the family	261	70.2%
	Student Housing	46	12.4%
Smoking status	Yes	101	27.2%
	No	271	72.8%
Family history of IBS	Yes	98	26.3%
	No	274	73.7%
Frequency of weekly junk food	None	40	10.8%
	1 – 2 times per week	236	63.4%
	3 – 4 times per week	81	21.8%
	Five times or more per week	15	4.0%
Caffeinated beverages consumption (tea, coffee, energy drinks, … etc.)	Never	10	2.7%
	Rarely	56	15.1%
	Sometimes	78	21.0%
	Mostly	89	23.9%
	Always	139	37.4%
Do you perform sports regularly?	Yes	73	19.6%
	No	299	80.4%
Do you complain of sleep disturbances?	Yes	208	55.9%
	No	164	44.1%

Figure 4.1: Distribution of student's gender

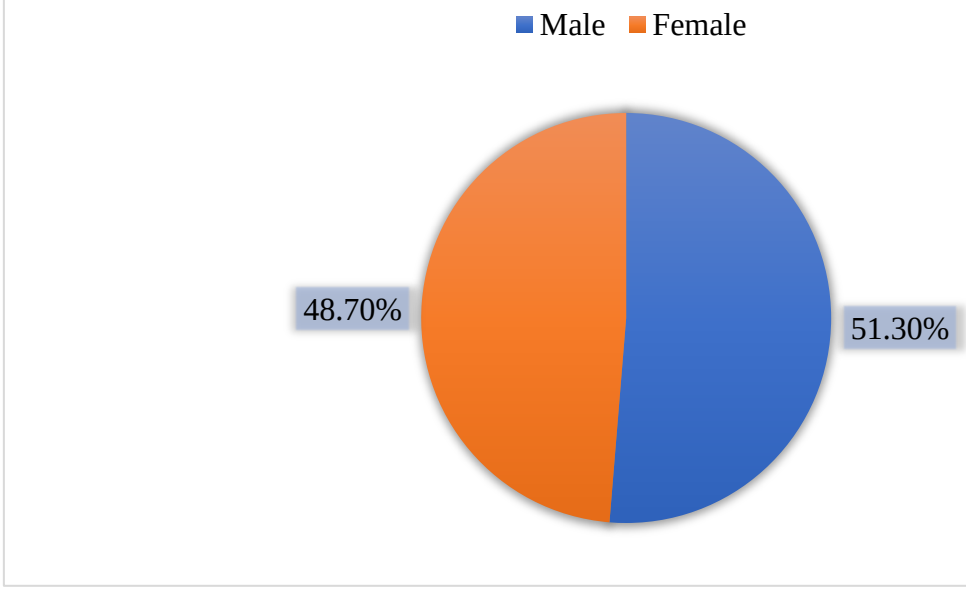


Figure 4.2: Distribution of student's faculties

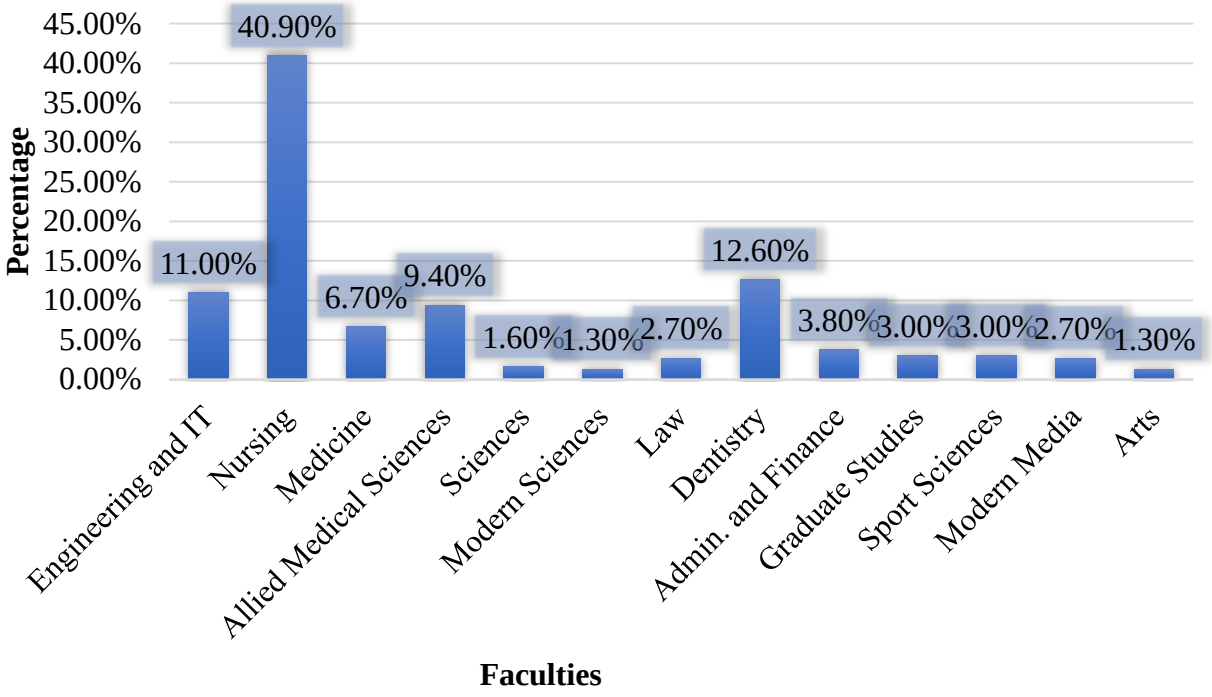


Figure 4.3: Distribution of student's academic year

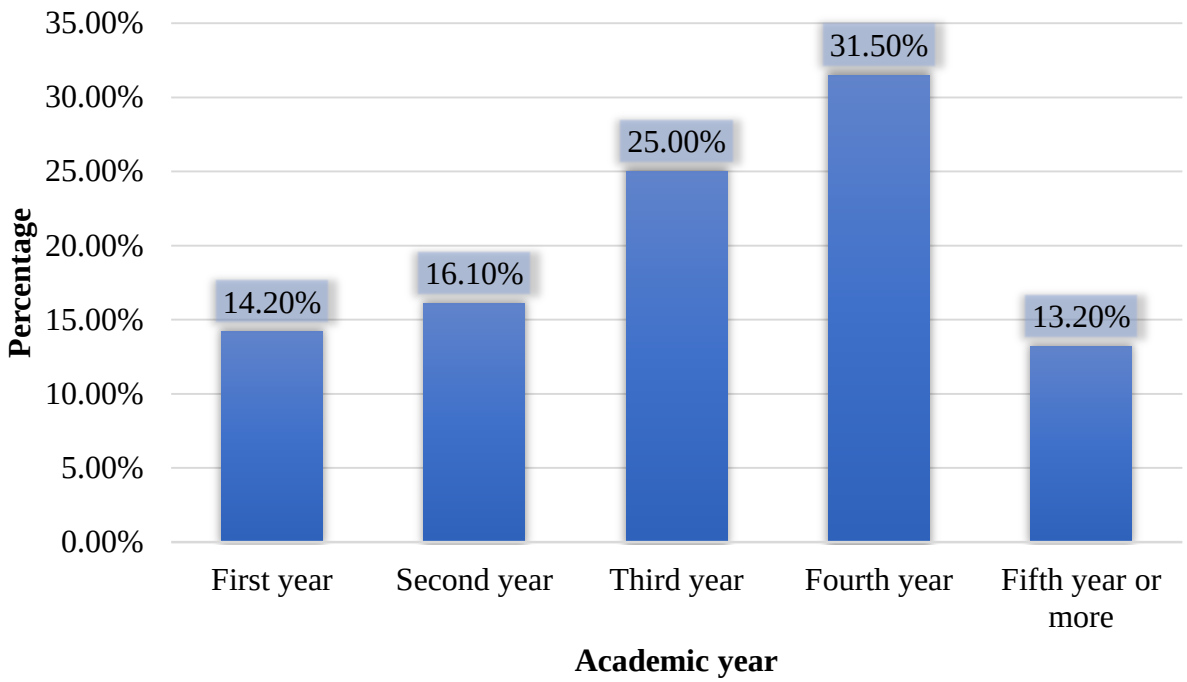


Figure 4.4: Distribution of student's living conditions

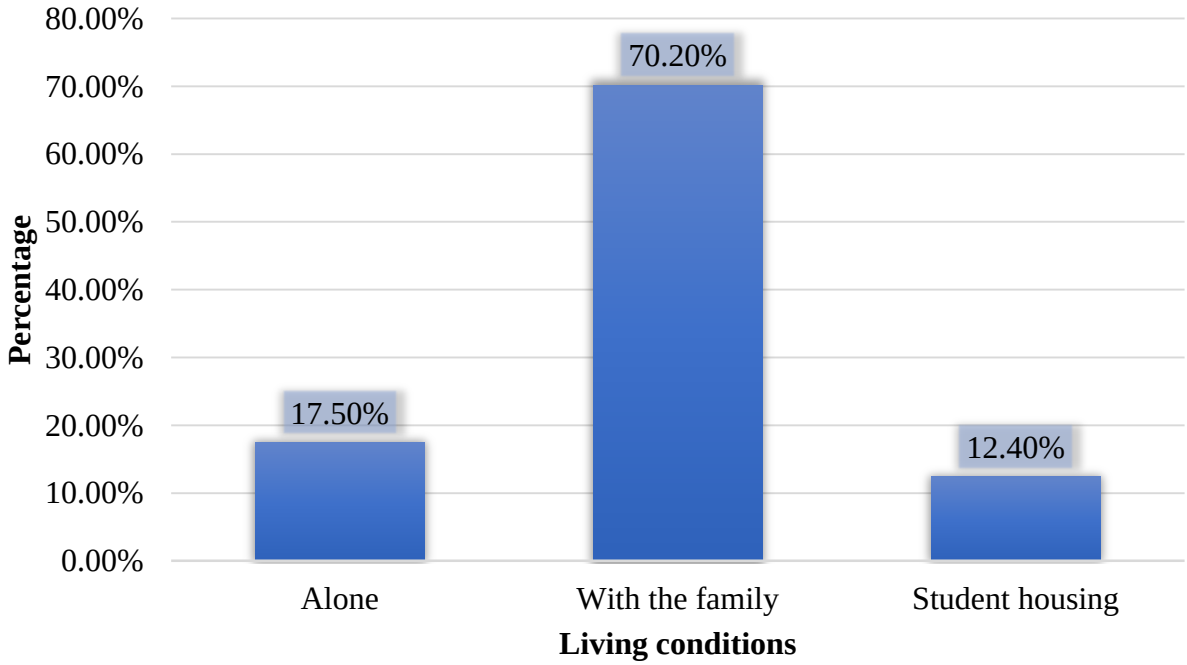


Figure 4.5: Distribution of student's health conditions

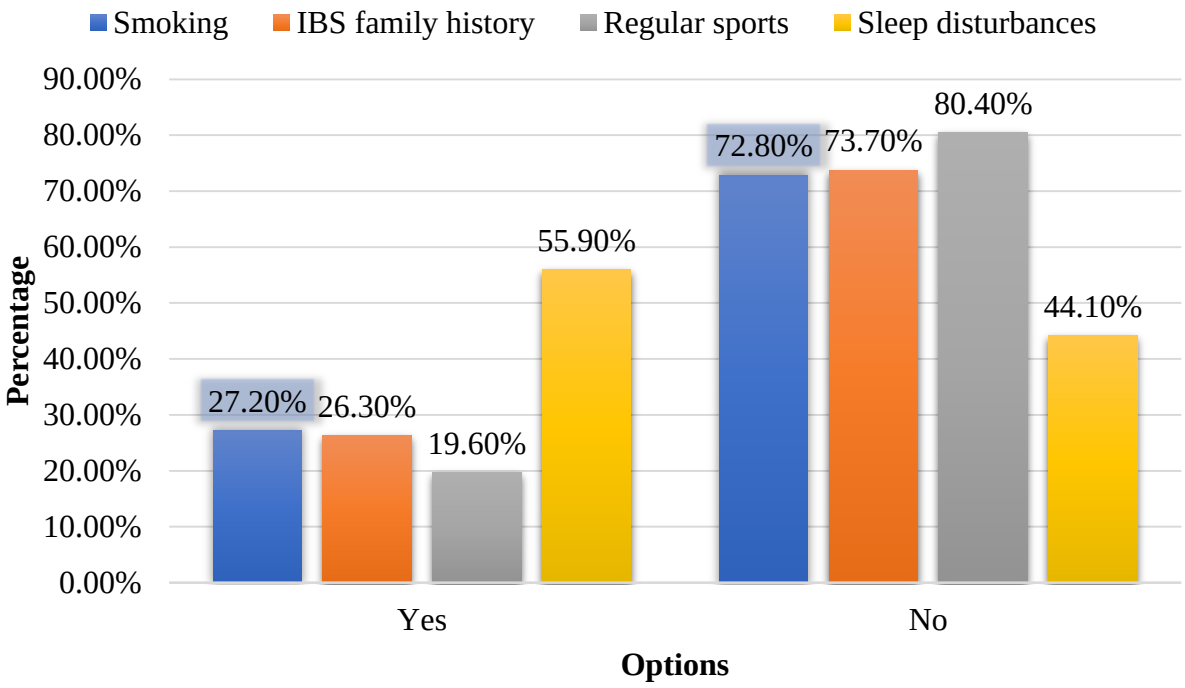
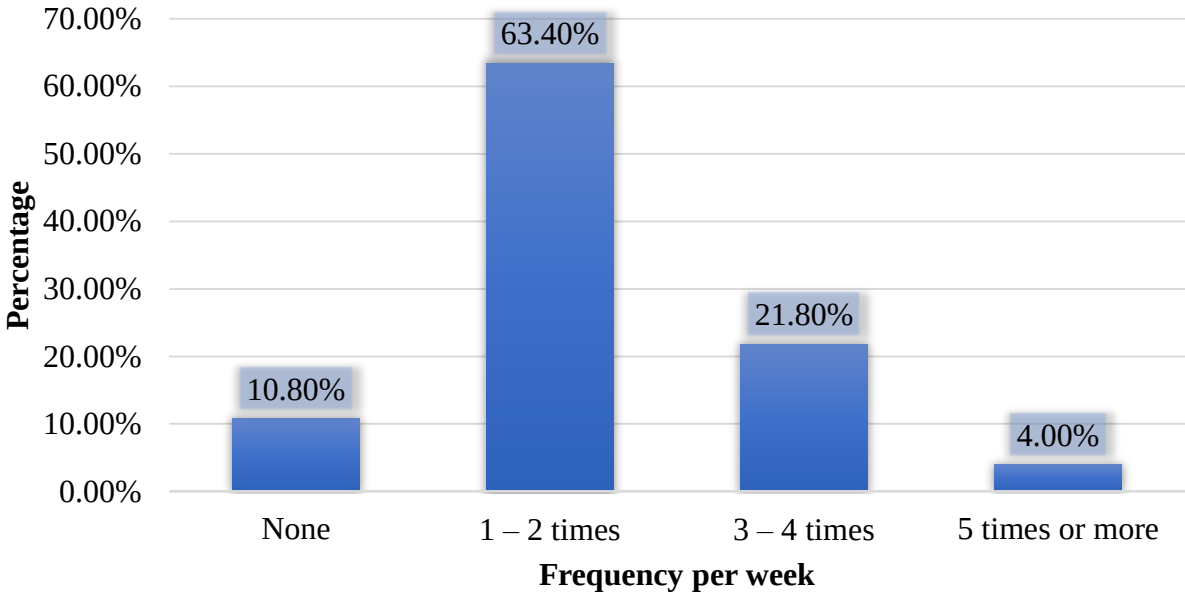
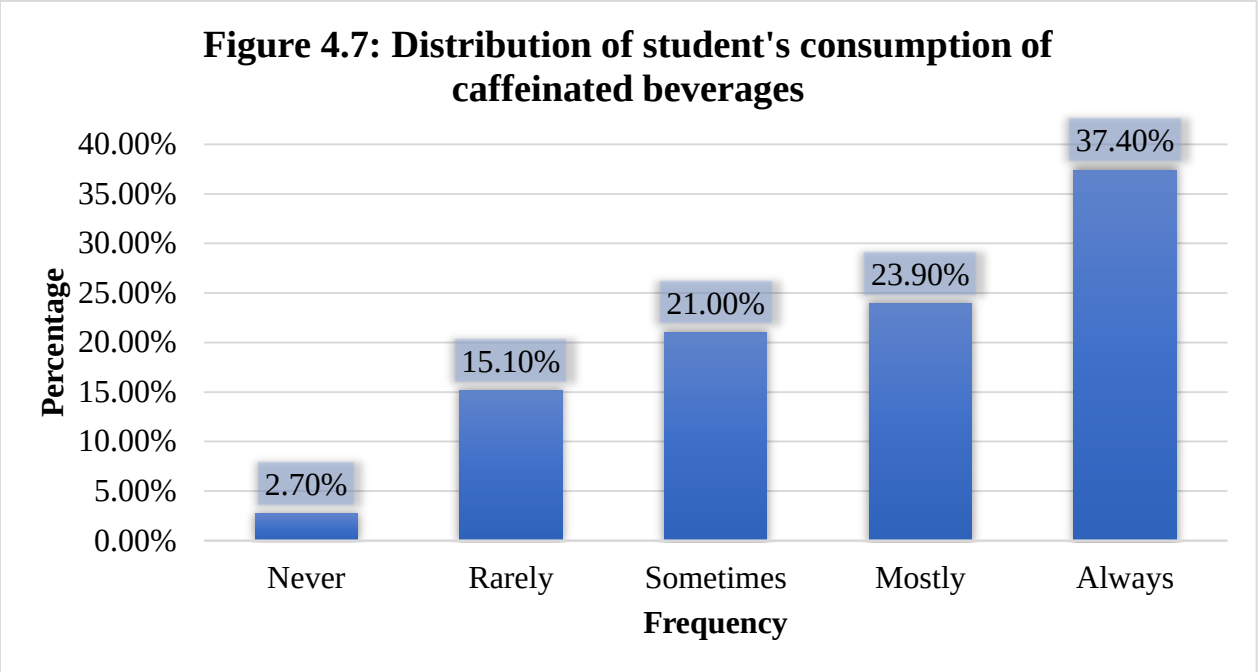


Figure 4.6: Distribution of student's consumption of junk food





Part 2: Diagnostic Questionnaire for Irritable Bowel Syndrome (IBS)

According to the tool used to assess IBS, the median score was 9 out of 40 (IQR = 13.75, ranging from zero to 38). According to the Rome IV tool, 13.2% met all the criteria, so the frequency of irritable bowel syndrome (IBS) was detected in 13.2% of the individuals. Also, the results showed that the most common subtype of IBS was the uncategorized subtype (38.7%), followed by IBS-M (23.0%) and IBS-C (22.3%), while 36.8% of the students reported that the signs and symptoms that they were asked about occurred for six months or more.

Figure 4.8: Distribution of IBS subtypes

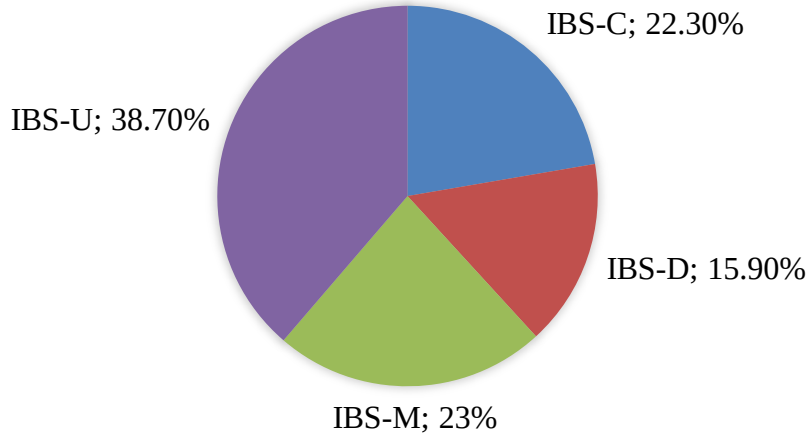
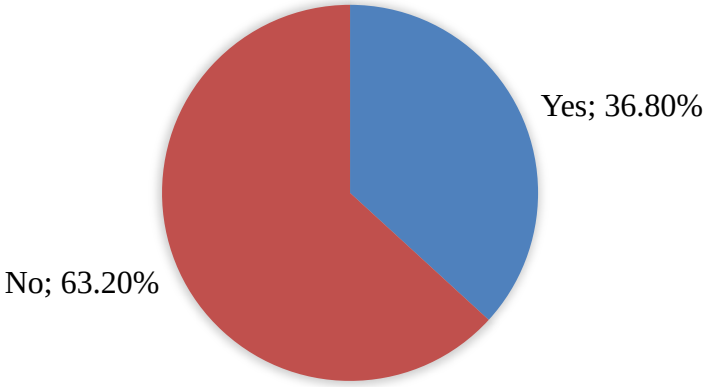


Figure 4.9: Distribution of ≥ 6 months of symptoms



Part 3: Depression, Anxiety, and Stress Scale (Dass-21)

The following table demonstrates the distribution of student's responses to items of the DASS-21 tool in frequencies and percentages. In the domain of depression, most statements showed that more students were not able to experience positive feelings (38.2% vs. 34.4%), had nothing to look forward to (39.8% vs. 33.3%), were not feeling worth much as a person (50.3% vs. 22.6%) and feeling their life was meaningless (38.2% vs. 25.3%) who do not apply to them than were applying to them to some degree, respectively.

The same applied to the domain of anxiety, where statements that were not used to the students more than devoted to some degree included experiencing breathing difficulties (41.4% vs. 32.8%), trembling (38.7% vs. 33.1%), worrying about panic-inducing situations (34.6% vs. 32.8%) or feeling close to panic (50.0% vs 26.9%), as well as the awareness of heart action in the absence of physical activity (35.2% vs 32.0%), and feeling scared without any good reason (42.7% vs 31.5%), respectively.

On the other hand, the domain of stress showed an opposite trend, where all statements showed higher percentages of students applying to them to some degree than not applying at all, including feeling hard to wind down (40.3% vs 25.3%), over-reacting to situations (31.2% vs 26.9%), using a lot of nervous energy (34.9% vs 19.9%), getting agitated (29.3% vs. 18.3%), the difficulty of relaxation (31.5% vs. 22.6%), intolerance to things that keeps them from getting on with what they were doing (33.1% vs. 24.2%) and feeling rather touchy (32.0% vs. 27.2%). The following bar chart represents the explained data.

Table 4.2: Distribution of student's responses to items of the DASS-21 tool

Statement	0		1		2		3	
	F	%	F	%	F	%	F	%
Depression								
1. I could not seem to experience any positive feelings at all	142	38.2%	128	34.4%	56	15.1%	46	12.4%
2. I found it challenging to work up the initiative to do things	132	35.5%	136	36.6%	70	18.8%	34	9.1%
3. I felt that I had nothing to look forward to	148	39.8%	124	33.3%	54	14.5%	46	12.4%
4. I felt down-hearted and blue	92	24.7%	128	34.4%	82	22.0%	70	18.8%
5. I was unable to become enthusiastic about anything	97	26.1%	116	32.1%	79	21.2%	80	21.5%
6. I felt I was not worth much as a person	197	53.0%	84	22.6%	43	11.6%	48	12.9%
7. I felt that life was meaningless	142	38.2%	94	25.3%	65	17.5%	71	19.1%
Anxiety								
1. I was aware of dryness in my mouth	122	32.8%	147	39.5%	69	18.5%	34	9.1%
2. I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	154	41.4%	122	32.8%	58	15.6%	38	10.2%
3. I experienced trembling (e.g., in the hands)	144	38.7%	123	33.1%	69	18.5%	36	9.7%
4. I was worried about situations in which I might panic and make a fool of myself	129	34.6%	122	32.8%	71	19.1%	50	13.4%
5. I felt I was close to panic	186	50.0%	100	26.9%	54	14.5%	32	8.6%
6. I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)	131	35.2%	119	32.0%	77	20.7%	45	12.1%
7. I felt scared without any good reason	159	42.7%	117	31.5%	61	16.4%	35	9.4%
Stress								
1. I found it hard to wind down	94	25.3%	150	40.3%	77	20.7%	51	13.7%
2. I tended to over-react to situations	100	26.9%	116	31.2%	94	25.3%	62	16.7%
3. I felt that I was using much nervous energy	74	19.9%	130	34.9%	84	22.6%	84	22.6%
4. I found myself getting agitated	68	18.3%	109	29.3%	102	27.4%	93	25.0%
5. I found it difficult to relax	84	22.6%	117	31.5%	91	24.5%	80	21.5%
6. I was intolerant of anything that kept me from getting on with what I was doing	90	24.2%	123	33.1%	88	23.7%	71	19.1%
7. I felt that I was rather touchy	101	27.2%	119	32.0%	94	25.3%	58	15.6%

0 = Doesn't apply to me, 1 = Applied to some degree, 2 = Applied to considerable degree, 3 = Applied very much, F = Frequency, % = Percent.

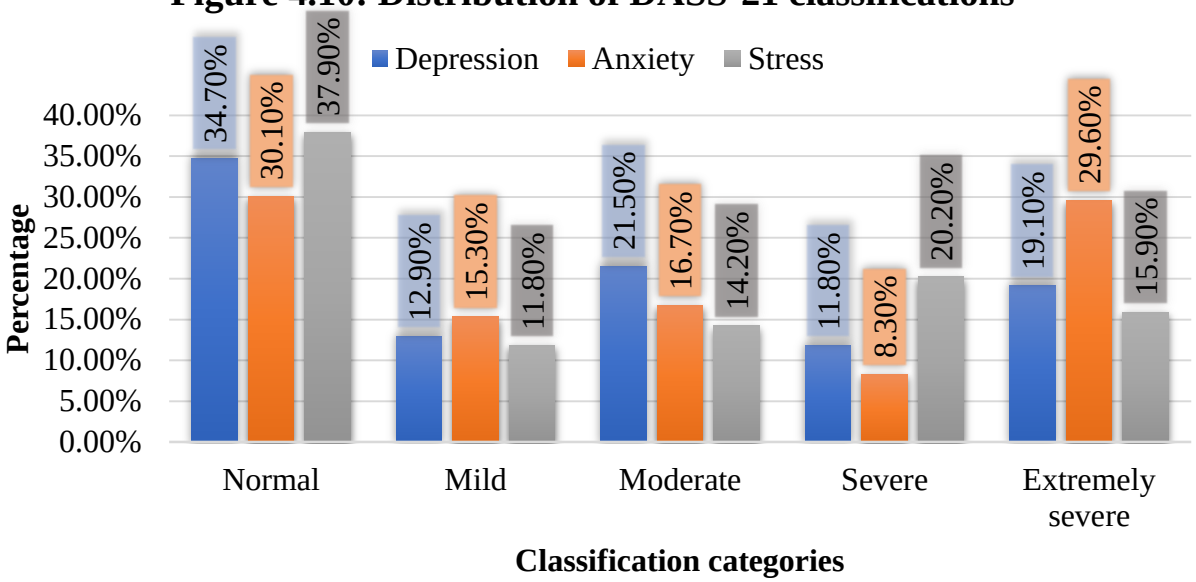
The analysis was conducted to determine the prevalence of various factors, which provided significant results. Participants indicated a high incidence of stress, with a prevalence rate of 62.1%. The study population exhibited a significant prevalence of anxiety, with a large incidence of 69.9%. Furthermore, depression played an important part, with a prevalence rate of 65.3%.

The scoring of the DASS-21 tool is based on the summation of the statement's scores of each domain and then classifying them into five categories, as shown in Table 4.3, which shows that the most significant percentage of students are within the normal ranges of risk of depression (34.7%), anxiety (30.1%) and stress (37.9%), while notable percentages of students have moderate depression (21.5%), extremely severe anxiety (29.6%) and severe stress (20.2%) scores. The following figure illustrates the distribution of the DASS-21 classifications among the students.

Table 4.3: Distribution of depression, anxiety, and stress scores classifications

	Subscales					
	Depression		**Anxiety**		**Stress**	
Classifications	**Frequency**	**Percentage**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Normal	129	34.7%	112	30.1%	141	37.9%
Mild	48	12.9%	57	15.3%	44	11.8%
Moderate	80	21.5%	62	16.7%	53	14.2%
Severe	44	11.8%	31	8.3%	75	20.2%
Extremely severe	71	19.1%	110	29.6%	59	15.9%
Median (IQR)	**7.00 (9)**		**6.00 (8)**		**10.00 (9)**	

Figure 4.10: Distribution of DASS-21 classifications



Part 4: Analytical Results

This part investigates the differences in IBS prevalence and DASS-21 scores and classifications according to student's demographic factors and the correlations between DASS-21 scores and IBS. Non-parametric tests were used as the distribution of the data was not expected.

Table 4.4 shows the results of the differences in mean ranks of IBS scores (using Mann-Whiney U and Kruskal-Wallis tests) according to the student's demographic factors. It shows that female students significantly had a higher mean rank (203.28) than male students (170.60), indicating higher scores of IBS among female university students ($p = 0.003$). Also, the IBS score was significantly correlated in a positive way ($r = 0.150$) with the age of the student ($p = 0.004$), indicating higher IBS scores with older age of the students, which is parallel with the finding that significantly higher mean ranks were found among students in their advanced academic years compared to earlier years ($p < 0.001$).

Although no significant association was found among students in IBS scores according to their type of faculty (medical vs. non-medical faculties, $p = 0.336$), living conditions ($p = 0.404$), or smoking status ($p = 0.653$)), the mean rank was significantly higher among students with a positive family history of IBS (234.92) than who did not have it (184.97, $p < 0.001$). Moreover, the frequency of junk food consumption was not significantly related to the scores of IBS ($p = 0.108$). Still, the consumption rate of caffeinated beverages was ($p = 0.013$), with a higher incidence of IBS with higher consumption. Lastly, regular sports were not significantly related to a different IBS mean rank ($p = 0.088$), but having sleep disturbances did, with a higher mean rank

among students who have sleep disturbances (197.82) than those who do not have them (172.14, p = 0.022).

Table 4.4: Association between student's demographic factors and IBS scores

Factor	Values	Mean rank	Test value	*p*
Gender	Male	170.60	14,248[a]	0.003*
	Female	203.28		
Age	Spearman Correlation	*r* = 0.150		0.004*
Faculty	Medical and health sciences	177.69	12,351[a]	0.336
	Non-medical and health sciences	189.41		
Academic year	First-year	172.17	25.305[b]	< 0.001*
	Second year	199.88		
	Third year	143.76		
	Fourth-year	206.00		
	Fifth year or more	220.18		
Living condition	Alone	181.59	1.813[b]	0.404
	With the family	184.24		
	Student Housing	206.27		
Smoking status	Yes	190.60	13,271[a]	0.653
	No	184.97		
Family history of IBS	Yes	234.92	8,680[a]	< 0.001*
	No	169.18		
Junk food consumption	None	164.19	6.072[b]	0.108
	1 – 2 times per week	182.89		
	3 – 4 times per week	210.10		
	Five times or more per week	175.37		
Caffeinated beverages consumption	Never	119.50	12.742[b]	0.013*
	Rarely	158.65		
	Sometimes	197.28		
	Mostly	209.34		
	Always	181.87		
Regular sports	Yes	167.26	9,509[a]	0.088
	No	191.20		
Sleep disturbances	Yes	197.82	14,701[a]	0.022*
	No	172.14		

*[a] = Mann-Whitney U test, [b] = Kruskal-Wallis test, * = Statistically significant*

The following table investigated the differences in mean rank scores of depression, anxiety, and stress according to student's demographic factors. The table shows that female students significantly had higher mean ranks than male students in depression (201.31 vs. 172.46, $p = 0.010$), anxiety (206.49 vs 167.56, $p < 0.001$), and stress (205.50 vs 168.50, $p < 0.001$). Also, the age of the students was significantly correlated with lower scores of depression ($r = - 0.118$, $p = 0.022$) but not with anxiety or stress scores. This is also parallel with the findings that lower mean ranks of depression scores are significantly found among students with advanced academic years compared to early academic years ($p = 0.034$). At the same time, the differences are not significant between students of medical and health sciences and not ($p > 0.05$).

Both living conditions and smoking status were not significantly related to differences in depression, anxiety, or stress ($p > 0.05$). At the same time, higher consumption of junk food and caffeinated beverages were significantly associated with higher mean rank scores of anxiety ($p = 0.004$ and 0.017, respectively) and stress ($p = 0.006$ and 0.017, respectively). Moreover, positive IBS family history was significantly associated with higher scores of depression (219.82 vs. 174.58, $p < 0.001$), anxiety (215.94 vs. 175.97, $p = 0.002$) and stress (218.66 vs. 175.00, $p < 0.001$) than who do not have a positive family history of IBS, respectively.

Lastly, students who do not perform regular sports significantly had higher scores of depression (192.77 vs 160.81, $p = 0.022$), anxiety (192.51 vs. 147.11, $p = 0.029$), and stress (196.12 vs 147.11, $p < 0.001$) than who reported performing regular sports, respectively. The same was found in the association between having sleep disturbances and the scores of depression (207.31 vs 160.11, $p < 0.001$), anxiety (209.75 vs 157.02, p

< 0.001), and stress (216.23 vs. 148.80, p < 0.001) than who do not have sleep disturbances, respectively.

Table 4.5: The Association between student's demographic factors and DASS-21 scores

Factor	Values	Depression			Anxiety			Stress		
		Mean rank	Test value	*p*	Mean rank	Test value	*p*	Mean rank	Test value	*P*
Gender	Male	172.46	14,604[a]	0.010*	167.56	13,667[a]	< 0.001*	168.50	13,847[a]	< 0.001*
	Female	201.31			206.49			205.50		
Age	Correlation	*r* = - 0.118		0.022*	*r* = 0.009		0.862	*r* = - 0.031		0.555
Faculty	Medical	183.20	12,640[a]	0.523	187.34	11,567[a]	0.065	182.77	12,750[a]	0.607
	Non-medical	175.42			164.90			176.50		
Academic year	First-year	215.63	10.406[b]	0.034*	185.60	5.669[b]	0.225	194.36	9.041[b]	0.060
	Second year	207.55			191.34			209.59		
	Third year	164.79			165.14			161.06		
	Fourth-year	182.97			199.75			194.06		
	≥ Fifth year	178.86			190.45			179.96		
Living condition	Alone	181.79	5.922[b]	0.052	197.12	4.141[b]	0.126	186.38	2.472[b]	0.291
	With family	193.67			188.97			190.57		
	Housing	152.47			157.50			163.58		
Smoking status	Yes	191.36	13,195[a]	0.594	204.07	11,911[a]	0.054	194.46	12,881[a]	0.383
	No	184.69			179.95			183.53		
Family history	Yes	219.82	10,161[a]	< 0.001*	215.94	10,541[a]	0.002*	218.66	10,274[a]	< 0.001*
	No	174.58			175.97			175.00		
Junk food consumption	None	153.43	4.317[b]	0.229	131.89	13.111[b]	0.004*	130.00	12.597[b]	0.006*
	1 – 2 times	190.97			189.50			191.71		
	3 – 4 times	190.20			198.31			197.48		
	≥ 5 times	184.30			221.17			195.93		
Caffeinated beverages	Never	197.65	6.921[b]	0.140	129.50	12.071[b]	0.017*	137.40	12.051[b]	0.017*
	Rarely	154.45			149.87			154.45		
	Sometimes	202.51			198.83			187.17		
	Mostly	188.02			186.75			180.74		
	Always	188.65			198.28			206.26		
Regular sports	Yes	160.81	9,038[a]	0.022*	161.87	9,115[a]	0.029*	147.11	8,038[a]	< 0.001*
	No	192.77			192.51			196.12		
Sleep disturbances	Yes	207.31	12,727[a]	< 0.001*	209.75	12,221[a]	< 0.001*	216.23	10,872[a]	< 0.001*
	No	160.11			157.02			148.80		

*[a] = Mann-Whitney U test, [b] = Kruskal-Wallis test, * = Statistically significant*

The following table aims to investigate the correlations between the scores of the IBS scale and the subscales of the DASS-21 tool. In conclusion, the table shows that all subscales significantly correlate with the IBS score positively and significantly.

In more detail, findings show that increased IBS scores were significantly associated with increased depression ($r = 0.327$, $p < 0.001$), anxiety ($r = 0.427$, $p < 0.001$), and stress ($r = 0.383$, $p < 0.001$). Also, the subscales of the DASS-21 tool were significantly inter-correlated, where increased depression is inter-correlated with both increased anxiety ($r = 0.427$, $p < 0.001$) and stress ($r = 0.591$, $p < 0.001$) and anxiety and stress are inter-correlated ($r = 0.666$, $p < 0.001$).

Table 4.6 Correlation between IBS and DASS-21 scores

Factor	Correlation with							
	IBS		Depression		Anxiety		Stress	
	r	*p*	*r*	*p*	*r*	*p*	*r*	*p*
IBS			0.327	< 0.001*	0.427	< 0.001*	0.383	< 0.001*
Depression	0.327	< 0.001*			0.673	< 0.001*	0.591	< 0.001*
Anxiety	0.427	< 0.001*	0.673	< 0.001*			0.666	< 0.001*
Stress	0.383	< 0.001*	0.591	< 0.001*	0.666	< 0.001*		

* = *Statistically significant*

Lastly, the following table investigated the prediction of IBS scores from the scores DASS-21 subscale's scores using a linear regression model, considering that the IBS score was considered the dependent variable. In contrast, depression, anxiety, and stress subscales were considered the independent variables (predictors). The table shows that anxiety ($B = 0.463$, $p < 0.001$) and stress ($B = 0.365$, $p < 0.001$) are considered significant predictors of IBS scores, while depression scores are not ($B = 0.002$, $p = 0.987$). Therefore, the following equation (extracted from the linear regression model)

can be used to predict the scores of IBS from the scores of anxiety and stress scores (that result from the DASS-21 tool):

IBS score = 4.186 + (0.464 x anxiety score) + (0.365 x stress score)

Higher IBS scores result in higher IBS severity, according to the IBS scoring tool used in the current study.

Table 4.7: DASS-21 subscales as predictors for IBS score

Predictors	Coefficient B	t	*p*	95% CI of B
Intercept	**4.186**	**4.862**	**< 0.001***	**2.493 – 5.879**
Depression	0.002	0.016	0.987	- 0.199 – 0.202
Anxiety	0.463	3.624	< 0.001*	0.212 – 0.715
Stress	0.365	3.636	< 0.001*	0.168 – 0.563

* = *Statistically significant, t = t-statistic, CI = Confidence interval. Note: Unstandardized Coefficient B was used.*

Summary of the Results

The results of the current study highlighted having approximately equal percentages of male (51.3%) and female (48.7%) students, with a median age of 22 years old, ranging from 18 to 50 years old, and mostly from medical and health sciences colleges. While 72.8% of the students reported being non-smokers, 73.7% of them have a free family history of IBS, 63.4% of them consume junk food 1 – 2 times per week, and 37.4% of them always consume caffeinated beverages, with 80.4% not performing regular sports, and more than half of them (55.9%) complaining of sleep disturbances.

Moreover, results showed a median score of IBS equals 9 out of 40, significantly higher among female students ($p = 0.003$), older students ($r = 0.150$, $p = 0.004$), advanced academic year ($p < 0.001$), students who have a positive family history of IBS ($p < 0.001$), who consume more caffeinated beverages ($p = 0.013$) and who complain of sleep disturbances ($p = 0.022$).

Results also mainly highlighted normal levels of depression (34.7%), anxiety (30.1%), and stress (37.9%). Higher depression scores were significantly found among female students ($p = 0.010$), older students ($r = 0.118$, $p = 0.022$), earlier academic years ($p = 0.034$), students who have a positive family history of IBS ($p < 0.001$), and who do not perform regular sports ($p = 0.022$) and complain of sleep disturbances ($p < 0.001$). In addition, significantly higher anxiety and stress scores were found among female students ($p < 0.001$ each) who have a positive IBS family history ($p = 0.002$ and < 0.001, respectively), higher consumers of junk food ($p = 0.004$ and 0.006, respectively) and caffeinated beverages ($p = 0.017$ each), as well as students who do not perform regular sports ($p = 0.029$ and < 0.001, respectively) and who complain of sleep disturbances ($p < 0.001$ each).

Lastly, significant inter-correlations were found between the scores of IBS and all subscales of DASS-21, with significant prediction of IBS scores by the scores of anxiety ($B = 0.463$, $p < 0.001$) and stress ($B = 0.365$, $p < 0.001$).

CHAPTER FIVE:

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Discussion

The following chapter is dedicated to discussing and concluding the current study results, in which the researcher provides a critical overview of the study's findings and investigations, focusing on their methodological points of them, alongside providing a comprehensive comparison between the current study results and what previously reviewed literature have found, investigating for similarities and contrasts, and how the current study may have been improved for the future research field in Palestine to take in consideration.

Regarding the sample characteristics, the researcher successfully recruited the recommended sample size calculated by the Sample Size Calculator (Raosoft Inc.), with 372 students from various colleges and majors. On the other hand, the study employed a convenient sampling method; the research tried to guarantee that the chosen sample accurately reflects the university population. A more thorough understanding of the association between DAS and IBS among students at the AAUP is made possible by this method. Unfortunately, randomization was very limited due to online-based learning during the data collection period because of current political situations; the data was collected via an online questionnaire organized by student affairs.

The aforementioned fact regarding the sampling method resulted in an issue related to the absence of normal distribution of the students, which may also be associated with the presence of extreme age values, as some of the students in the Faculty of Graduate Studies are significantly older, which is expected for students who

may have the intention to finish their higher educations later during their career. Such abnormal distribution made it difficult for the researcher to generalize the findings on the overall population of university students. However, several findings were parallel to previous studies, as discussed later. Moreover, non-parametric tests were used, in which the median age of the students was 22 years old while the mean was 22.6 ± 4.4, which is closer to the age of undergraduate senior academic year, and this may be related to the fact that plenty of students do not immediately start their university studying after finishing high school degree.

As mentioned earlier in the previous literature review, several studies have been conducted related to the current topic among medical and health sciences students, which may be related to more cooperation with and comprehension of scientific research. Therefore, a noticeable percentage of studies did not even include university students rather than medical students. When non-medical students were included, the researchers reported the limitation of difficult sampling among them. In the current study, a similar pattern was found, where the majority of the recruited students were from medical sciences, like nursing (40.9%), dentistry (12.6%), and allied medical sciences (like physiotherapy, occupational therapy, and radiology, 9.4%). The mentioned limitation related to the inability to gather an official distribution of students in different colleges may have also helped in the difficulty of proportionally representing students to their college's proportions.

Some of the sample's characteristics were obviously different in the current study than others. A good example is the living conditions, where 70.2% of the students in the current study reported living with their families. In contrast, previous studies found

lower percentages, including the study of (Hakami et al., 2019a), who found this percentage to be as low as 7.6% among Saudi students, possibly related to multinationalism and different socioeconomic status. It is worth mentioning that the researcher recommends to further study the caffeinated beverages and junk food habits among university students in Palestine, which was found to be relatively unhealthy, where 37.4% of them always consume caffeinated beverages and 63.4% of them consume junk food 1 – 2 times per week, as well as the encouraging of performing more regular sports (80.4% do not).

In compliance with the contract that was signed with Rome Foundation, the researcher was unable to clearly state the responses of students related to the scale statements about the frequency of abdominal pain and its connection with defecation, as well as the frequency of changes in the consistency of defecation, which yielded a scoring system out of 40. Therefore, this part of IBS scoring is not eligible for comparison with other studies. On the other hand, the proportions of IBS subtypes can be compared to other studies, in which the current study found that the most common subtypes of IBS were uncategorized subtypes (38.7%), followed by IBS-M (mixed, 23.0%) and IBS-C (constipation, 22.3%). Different findings were found in previous studies, where the Lebanese study by Costanian et al. (2015) found that IBS-M is the most common (44.8%), followed by IBS-C (36.8%), and Chen et al. (2021) found that similar findings to the Lebanese one (50% for IBS-M and 23.3% for IBS-C). The differences in subtype prevalence are mostly related to the different versions of Rome criteria used, where the fourth version was used in the current study, and the third version was used in the previously mentioned studies.

The current study found that higher scores of IBS were found among female students ($p = 0.003$), which is similar to other studies findings (M. K. Alaqeel et al., 2017; Costanian et al., 2015; N. K. Ibrahim, 2016; Yang et al., 2022b). Higher prevalence of IBS among females can be interpreted as the variations between both genders, including hormonal differences, lower pain threshold, stress responses, and social factors (Kim & Kim, 2018). Results have also shown a significant correlation between age and IBS score ($r = 0.150$, $p = 0.004$), and this can be related to higher exposure to stressors and changes in eating habits and gastrointestinal structure with advanced age. The same can be applied to the association between advanced academic years and higher scores of IBS ($p < 0.001$), which is similar to previous studies (Spillebout et al., 2019), which can be interpreted with higher academic load among students in their advanced academic years, especially among medical and health sciences students who start to have clinical training and challenges. On the other hand, several other studies have found no difference in IBS among different academic years. In the current study, no significant differences were found between medical and non-medical faculties students, which is in contrast to what other studies have found (Chen et al., 2021; Hakami et al., 2019b), who found that medical students significantly have higher proportions of IBS. The differences in such findings may be related to the comparison of IBS scores (out of 40) rather than IBS diagnosis (as a categorical variable, “yes” or “no”) in the current study. Therefore, it is recommended to conduct such a comparison with the help of clinical decisions.

Living conditions (with or without the family) were not significantly related to different IBS scores in the current study, which is not parallel with other studies findings (Costanian et al., 2015), who found lower percentages of IBS among those who

live with their families, which can be related to differences in percentages of students who live with families between different cultures, and that family support presents when living with them, and therefore more stress coping.

Junk food consumption was not related to significantly higher IBS scores in the current study ($p = 0.108$), which can be interpreted by physiological causes that the current research is not intended to investigate and that students were more likely to consume low-to-moderate amounts of them per week. In comparison, higher caffeinated beverage consumption correlated with higher IBS scores ($p = 0.013$). The consumption of more caffeinated beverages may be related to more stressful life and events, which is linked to the development of IBS, as similarly found in previous studies (Engel, 1977), as well as physiological factors associated with higher consumption of caffeinated beverages that are not discussed in the current study.

The connection between performing regular sports and protection from developing IBS may not be clear, but several studies found that performing regular sports is linked to significantly lower proportions of IBS (Chen et al., 2021; Costanian et al., 2015), which is somehow similar to the current study findings, where the mean rank of IBS scores was lower among students who reported performing regular sports (167.26) compared to who do not (191.20). Still, it was insignificant ($p = 0.088$). The finding related to significantly higher prevalences of IBS among students with sleep disturbances in the current study ($p = 0.022$) was similar to previous studies (N. K. Ibrahim, 2016; Y. Liu et al., 2014; Seger et al., 2020; Spillebout et al., 2019), which can be related to dysfunctional brain-gut axis process as caused by disturbed nervous functioning with increased sleep deprivation, although the researcher recommends to

utilize more quantifying method of sleep disturbances and deprivation assessment tools in the future research in Palestine, and its link with IBS.

The main findings in the current study are related to the correlation and prediction of IBS based on the psychological parameters of DAS. The current study was parallel with the findings of several previously reviewed studies in the positive connection between depression (r = 0.327), anxiety (r = 0.427), and stress (r = 0.383) and IBS scores ($p < 0.001$), which are similar to all of the previous studies, with some differences in that some studies found parameters more correlated or not significantly related to IBS. The psychological parameter that was found to be mainly linked is stress, while depression and anxiety were less noticed to be significantly related to IBS. The interpretation of such a correlation may be related to the higher prevalence of stress compared to the other two psychological parameters, as well as its higher frequency and difficulty to cope with because it is more linked to situations and events throughout life, which dramatically change and differ from one time to another.

Also, the current study used a regression model (linear regression) to try to predict the IBS scores from the scores of the psychological parameters, and it found that stress and anxiety are significant predictors for IBS scores, unlike depression. Stress and anxiety were also found to predict IBS in previous studies, but the study of Spillebout et al. (2019) found that depression was also a predictor. Also, depression was a significant predictor of IBS alongside anxiety in the SR of Sibelli et al. (2016), although they did not investigate the prediction of stress. In contrast, the study of Seger et al. (2020) found that depression is a significant predictor of IBS ($p < 0.001$), while anxiety was not ($p = 0.145$). Although several factors were significantly associated with IBS, Yang et al.

(2022b) did not find any of the psychological parameters to be a significant predictor of IBS, and this may be related to the inclusion of a variety of studies with various sample characters. Still, the homogeneity of included studies makes this conclusion more comprehensive, as a rigorous meta-analysis was conducted. The differences in the prediction of IBS based on the psychological parameters between the current research and the previous studies, as well as between the precious studies themselves, may be related to different logistic vs linear regression models that were used, as well as differences in the entered predictors to be tested, in addition to the differences in the used instruments, both in assessing the psychological parameters (DASS-21 vs. PSS vs. others) and Rome criteria version for IBS.

Study Implications

The study findings have many significant implications. The study outcome can be used in shaping policies by the Palestinian government and the Ministry of Education to provide a better educational environment through integrated healthcare interventions in university settings, addressing the associations between psychosocial factors and gastrointestinal health, and advocating for comprehensive mental health support in educational institutions.

Strengths

To the author's best knowledge, this study stands out as the first of its kind conducted within the Palestinian universities, contributing novel insights to the global understanding specifically within this cultural context.

While conducted in a specific context, the study's methodology and findings can be transferable to similar university settings. This enhances the generalizability of the research and facilitates comparisons with studies conducted in different cultural and educational environments.

Limitations

The study was conducted with the following limitations to be considered:

1. The main limitation in the current study was related to the recruitment of the students, in which the researcher was unable to gather the official number of students in each college after failed communication with the related party, and therefore was forced to recruit the sample conveniently.
2. The study was conducted in a single educational institution (AAUP), which was limited by academic and clinical responsibilities.
3. Data were collected using an online Google Form, which may expose a certain level of bias related to the collected data. Still, the researcher could not conduct individual interviews with each participant to collect the data.

Summary of Main Findings

The current study aimed to investigate the association between depression, anxiety, and stress and the development of IBS among a stratified convenient sample of university students at AAUP, using a self-administered questionnaire that was distributed to a sample of 372 students from 13 colleges. This topic is significant as it highlights the connection between the nervous and gastrointestinal tracts, also known as the brain-gut axis, which is less studied among Palestinian students.

Results of the current study found the median age of the students was 22 years old, mostly from medical and health sciences colleges (40.9% nursing), 26.3% of which have a positive family history of IBS, 37.4% always consume caffeinated beverages, and 80.4% do not perform regular sports. More importantly, 38.7% of the students had uncategorized IBS subtype, followed by approximate percentages of IBS-M (23.0%) and IBS-C (22.3%), with significantly higher IBS scores among females, older students, advanced academic year, positive family history, more consumed caffeinated beverages and irregular sports, and significantly predicted by anxiety and stress, but not depression.

It is recommended to conduct more studies related to the same topic, with the inclusion of more characteristics of the students and the use of more specific instruments, as well as including several universities with the use of probability sampling to help generalize the findings.

Recommendations

Based on the discussion of the study's results, the researcher recommends the following:

1. Increase the focus on the psychological aspects of university student's support, as it may alleviate the risk of developing IBS and other eating disorders among them, therefore enhancing the quality of life and academic achievements.
2. Include several universities in Palestine in future studies related to the same topic, allowing for a deeper understanding of the differences in the relationship between DAS and IBS in various Palestinian settings.

3. Conduct future studies with a randomized selection of students, which will help generalize the results.
4. Increase the level of awareness among the students about the importance of seeking psychological support during the academic period, using targeted campaigns and educational sessions, as well as conduct experimental studies related to the impact of such psychological interventions on the improvement in academic levels and long-term positive consequences on the physiological level.

References

Alaa Adel, M., Heba Ahmed, M., Hebatallah, N.-E., & Rabab Atta, S. (2021). Association of anxiety-depressive disorders with irritable bowel syndrome among patients attending a rural family practice center: a comparative cross-sectional study. *General Psychiatry*, *34*(6), e100553. https://doi.org/10.1136/gpsych-2021-100553

Alaqeel, M. K., Alowaimer, N. A., Alonezan, A. F., Almegbel, N. Y., & Alaujan, F. Y. (2017). Prevalence of Irritable Bowel Syndrome and its Association with Anxiety among Medical Students at King Saud bin Abdulaziz University for Health Sciences in Riyadh. *Pak J Med Sci*, *33*(1), 33-36. https://doi.org/10.12669/pjms.331.12572

Alharbi, W., & Jahan, S. (2022). Prevalence and Associated Risk Factors of Irritable Bowel Syndrome Among Female Secondary School students in Ar Rass City, Qassim Region. *Health Psychol Res*, *10*(3), 35482. https://doi.org/10.52965/001c.35482

Alshammari, O. M., Almuslam, A. S., Alrashidi, A. A., Alharbi, K. F. O., Alqasem, A. A., Aljubour, Z. A., Almezani, A. M. M., Alkhalaf, A. A., Alharbi, M. N. K., & Alhuwayfi, S. A. (2018). Prevalence of irritable bowel syndrome among medical students in hail University, Saudi Arabia. *The Egyptian Journal of Hospital Medicine*, *71*(2), 2581-2584.

Amin, H. S., Irfan, F., Karim, S. I., Almeshari, S. M., Aldosari, K. A., Alzahrani, A. M., Almogbel, A. T., Alfouzan, S. M., & Alsaif, A. A. (2021). The prevalence of irritable bowel syndrome among Saudi population in Riyadh by use of Rome IV criteria and self-reported dietary restriction. *Saudi J Gastroenterol*, *27*(6), 383-390. https://doi.org/10.4103/sjg.sjg_43_21

Basandra, S., & Bajaj, D. (2014). Epidemiology of Dyspepsia and Irritable Bowel Syndrome (IBS) in Medical Students of Northern India. *J Clin Diagn Res*, *8*(12), Jc13-16. https://doi.org/10.7860/jcdr/2014/10710.5318

Belbasis, L., & Bellou, V. (2018). Introduction to Epidemiological Studies. *Methods Mol Biol*, *1793*, 1-6. https://doi.org/10.1007/978-1-4939-7868-7_1

Black, C. J., Drossman, D. A., Talley, N. J., Ruddy, J., & Ford, A. C. (2020). Functional gastrointestinal disorders: advances in understanding and management. *The Lancet*, *396*(10263), 1664-1674.

Black, C. J., & Ford, A. C. (2020). Global burden of irritable bowel syndrome: trends, predictions and risk factors. *Nature Reviews Gastroenterology & Hepatology*, *17*(8), 473-486. https://doi.org/10.1038/s41575-020-0286-8

Black, C. J., Yiannakou, Y., Houghton, L. A., & Ford, A. C. (2020). Epidemiological, Clinical, and Psychological Characteristics of Individuals with Self-reported Irritable Bowel Syndrome Based on the Rome IV vs Rome III Criteria. *Clin Gastroenterol Hepatol*, *18*(2), 392-398.e392. https://doi.org/10.1016/j.cgh.2019.05.037

Brenneisen Mayer, F., Souza Santos, I., Silveira, P. S., Itaqui Lopes, M. H., de Souza, A. R., Campos, E. P., de Abreu, B. A., Hoffman Ii, I., Magalhães, C. R., Lima, M. C., Almeida, R., Spinardi, M., & Tempski, P. (2016). Factors associated to depression and anxiety in medical students: a multicenter study. *BMC Med Educ*, *16*(1), 282. https://doi.org/10.1186/s12909-016-0791-1

Camilleri, M. (2021). Diagnosis and Treatment of Irritable Bowel Syndrome: A Review. *JAMA*, *325*(9), 865-877. https://doi.org/10.1001/jama.2020.22532

Chen, H.-H., Hung, C.-H., Kao, A.-W., & Hsieh, H.-F. (2021). Exploring Quality of Life, Stress, and Risk Factors Associated with Irritable Bowel Syndrome for Female University Students in Taiwan. *International Journal of Environmental Research and Public Health*, *18*(8), 3888. https://www.mdpi.com/1660-4601/18/8/3888

Collins, S. M., & Bercik, P. (2009). The Relationship Between Intestinal Microbiota and the Central Nervous System in Normal Gastrointestinal Function and Disease. *Gastroenterology*, *136*(6), 2003-2014. https://doi.org/https://doi.org/10.1053/j.gastro.2009.01.075

Corsini, R. J., & Ozaki, B. D. (1994). *Encyclopedia of psychology* (Vol. 1). Wiley New York.

Costanian, C., Tamim, H., & Assaad, S. (2015). Prevalence and factors associated with irritable bowel syndrome among university students in Lebanon: findings from a

cross-sectional study. *World J Gastroenterol*, *21*(12), 3628-3635. https://doi.org/10.3748/wjg.v21.i12.3628

Deng, Y., Cherian, J., Khan, N. U. N., Kumari, K., Sial, M. S., Comite, U., Gavurova, B., & Popp, J. (2022). Family and Academic Stress and Their Impact on Students' Depression Level and Academic Performance [Original Research]. *Frontiers in Psychiatry*, *13*. https://doi.org/10.3389/fpsyt.2022.869337

Drossman, D., Thompson, W. G., Talley, N., Funch-Jensen, P., Janssens, J., & Whitehead, W. (1990). Identification of sub-groups of functional gastrointestinal disorders. *Gastroenterology international*, *3*(4), 159-172.

Drossman, D. A., Morris, C. B., Hu, Y., Toner, B. B., Diamant, N., Leserman, J., Shetzline, M., Dalton, C., & Bangdiwala, S. I. (2005). A prospective assessment of bowel habit in irritable bowel syndrome in women: defining an alternator. *Gastroenterology*, *128*(3), 580-589. https://doi.org/10.1053/j.gastro.2004.12.006

Elhosseiny, D., Mahmoud, N. E., & Manzour, A. F. (2019a). Factors associated with irritable bowel syndrome among medical students at Ain Shams University. *Journal of the Egyptian Public Health Association*, *94*, 1-9.

Elhosseiny, D., Mahmoud, N. E., & Manzour, A. F. (2019b). Factors associated with irritable bowel syndrome among medical students at Ain Shams University. *Journal of the Egyptian Public Health Association*, *94*(1), 23. https://doi.org/10.1186/s42506-019-0023-8

Engel, G. L. (1977). The Need for a New Medical Model: A Challenge for Biomedicine. *Science*, *196*(4286), 129-136. https://doi.org/doi:10.1126/science.847460

Farzaneh, N., Ghobakhlou, M., Moghimi-Dehkordi, B., Naderi, N., & Fadai, F. (2012). Evaluation of Psychological Aspects Among Subtypes of Irritable Bowel Syndrome. *Indian Journal of Psychological Medicine*, *34*(2), 144-148. https://doi.org/10.4103/0253-7176.101780

Fauzi, M. F., Anuar, T. S., Teh, L. K., Lim, W. F., James, R. J., Ahmad, R., Mohamed, M., Abu Bakar, S. H., Mohd Yusof, F. Z., & Salleh, M. Z. (2021). Stress, Anxiety and Depression among a Cohort of Health Sciences Undergraduate Students: The Prevalence and Risk Factors. *International Journal of*

Environmental Research and Public Health, *18*(6), 3269. https://www.mdpi.com/1660-4601/18/6/3269

Folks, D. G. (2004). The interface of psychiatry and irritable bowel syndrome. *Curr Psychiatry Rep*, *6*(3), 210-215. https://doi.org/10.1007/s11920-004-0066-0

Ford, A. C., Lacy, B. E., & Talley, N. J. (2017). Irritable Bowel Syndrome. *N Engl J Med*, *376*(26), 2566-2578. https://doi.org/10.1056/NEJMra1607547

Ford, A. C., Sperber, A. D., Corsetti, M., & Camilleri, M. (2020). Irritable bowel syndrome. *Lancet*, *396*(10263), 1675-1688. https://doi.org/10.1016/s0140-6736(20)31548-8

Ford, A. C., Talley, N. J., Veldhuyzen van Zanten, S. J., Vakil, N. B., Simel, D. L., & Moayyedi, P. (2008). Will the history and physical examination help establish that irritable bowel syndrome is causing this patient's lower gastrointestinal tract symptoms? *Jama*, *300*(15), 1793-1805. https://doi.org/10.1001/jama.300.15.1793

Fukudo, S., Okumura, T., Inamori, M., Okuyama, Y., Kanazawa, M., Kamiya, T., Sato, K., Shiotani, A., Naito, Y., Fujikawa, Y., Hokari, R., Masaoka, T., Fujimoto, K., Kaneko, H., Torii, A., Matsueda, K., Miwa, H., Enomoto, N., Shimosegawa, T., & Koike, K. (2021). Evidence-based clinical practice guidelines for irritable bowel syndrome 2020. *J Gastroenterol*, *56*(3), 193-217. https://doi.org/10.1007/s00535-020-01746-z

Hakami, R. M., Elmakki, E., Hasanain, T., Alnami, A., Khawaji, A., Ali, L., Tobaigy, M., Allayl, A., Faqihi, I., Bajoned, M., Hakami, R., & Hakami, M. (2019a). Irritable Bowel Syndrome: Assessment of Prevalence and Risk Factors in Saudi University Students Using Rome IV Criteria. *Gastroenterology Insights*, *10*(1).

Hakami, R. M., Elmakki, E., Hasanain, T., Alnami, A., Khawaji, A., Ali, L., Tobaigy, M., Allayl, A., Faqihi, I., Bajoned, M., Hakami, R., & Hakami, M. (2019b). Irritable Bowel Syndrome: Assessment of Prevalence and Risk Factors in Saudi University Students Using Rome IV Criteria. *Gastroenterology Insights*, *10*(1), 8239. https://www.mdpi.com/2036-7422/10/1/8239

Hausteiner-Wiehle, C., & Henningsen, P. (2014). Irritable bowel syndrome: relations with functional, mental, and somatoform disorders. *World J Gastroenterol*, *20*(20), 6024-6030. https://doi.org/10.3748/wjg.v20.i20.6024

Holtmann, G. J., Ford, A. C., & Talley, N. J. (2016). Pathophysiology of irritable bowel syndrome. *The lancet Gastroenterology & hepatology*, *1*(2), 133-146.

Hreish, K., & Okkeh, M. (2021). The Psychological, Academic and Social Problems and Stress that Palestinian University Students Suffer from in the First Academic.

Hu, Z., Li, M., Yao, L., Wang, Y., Wang, E., Yuan, J., Wang, F., Yang, K., Bian, Z., & Zhong, L. L. D. (2021). The level and prevalence of depression and anxiety among patients with different subtypes of irritable bowel syndrome: a network meta-analysis. *BMC Gastroenterol*, *21*(1), 23. https://doi.org/10.1186/s12876-020-01593-5

Ibrahim, A. K., Kelly, S. J., Adams, C. E., & Glazebrook, C. (2013). A systematic review of studies of depression prevalence in university students. *J Psychiatr Res*, *47*(3), 391-400. https://doi.org/10.1016/j.jpsychires.2012.11.015

Ibrahim, N. K. (2016). A systematic review of the prevalence and risk factors of irritable bowel syndrome among medical students. *Turk J Gastroenterol*, *27*(1), 10-16. https://doi.org/10.5152/tjg.2015.150333

Ibrahim, N. K. (2016). A systematic review of the prevalence and risk factors of irritable bowel syndrome among medical students. *Turk J Gastroenterol*, *27*(1), 10-16.

Ibrahim, N. K., Bashawri, J., Al Bar, H., Al Ahmadi, J., Al Bar, A., Qadi, M., Milaat, W., & Feda, H. (2013). Premarital Screening and Genetic Counseling program: knowledge, attitude, and satisfaction of attendees of governmental outpatient clinics in Jeddah. *J Infect Public Health*, *6*(1), 41-54. https://doi.org/10.1016/j.jiph.2012.05.001

Ibrahim, N. K., Battarjee, W. F., & Almehmadi, S. A. (2013). Prevalence and predictors of irritable bowel syndrome among medical students and interns in King Abdulaziz University, Jeddah. *The Libyan journal of medicine*, *8*(1), 21287. https://doi.org/10.3402/ljm.v8i0.21287

Ikechi, R., Fischer, B. D., DeSipio, J., & Phadtare, S. (2017). Irritable Bowel Syndrome: Clinical Manifestations, Dietary Influences, and Management. *Healthcare (Basel)*, *5*(2). https://doi.org/10.3390/healthcare5020021

Ip, E. J., Nguyen, K., Shah, B. M., Doroudgar, S., & Bidwal, M. K. (2016). Motivations and predictors of cheating in pharmacy school. *American journal of pharmaceutical education*, *80*(8).

Irvine, A. J., Chey, W. D., & Ford, A. C. (2017). Screening for Celiac Disease in Irritable Bowel Syndrome: An Updated Systematic Review and Meta-analysis. *Am J Gastroenterol*, *112*(1), 65-76. https://doi.org/10.1038/ajg.2016.466

Ivandic, I., Kamenov, K., Rojas, D., Cerón, G., Nowak, D., & Sabariego, C. (2017). Determinants of work performance in workers with depression and anxiety: a cross-sectional study. *International journal of environmental research and public health*, *14*(5), 466.

Jadallah, K. A., Khatatbeh, M. M., Sarsak, E. W., Sweidan, A. N., & Alzubi, B. F. (2022). Irritable bowel syndrome and its associated factors among Jordanian medical students: A cross-sectional study. *Medicine (Baltimore)*, *101*(33), e30134. https://doi.org/10.1097/md.0000000000030134

January, J., Madhombiro, M., Chipamaunga, S., Ray, S., Chingono, A., & Abas, M. (2018). Prevalence of depression and anxiety among undergraduate university students in low-and middle-income countries: a systematic review protocol. *Systematic reviews*, *7*(1), 1-5.

Jelsness-Jørgensen, L.-P., Bernklev, T., & Moum, B. (2012). Fatigue and disease-related worries among inflammatory bowel disease patients in remission; is it a reflection of coexisting IBS-like symptoms? A short report. *Journal of psychosomatic research*, *73*(6), 469-472.

Jones, M. P., Tack, J., Van Oudenhove, L., Walker, M. M., Holtmann, G., Koloski, N. A., & Talley, N. J. (2017). Mood and anxiety disorders precede development of functional gastrointestinal disorders in patients but not in the population. *Clinical Gastroenterology and Hepatology*, *15*(7), 1014-1020. e1014.

Kamp, E. J., Kane, J. S., & Ford, A. C. (2016). Irritable Bowel Syndrome and Microscopic Colitis: A Systematic Review and Meta-analysis. *Clin Gastroenterol Hepatol*, *14*(5), 659-668.e651; quiz e654-655. https://doi.org/10.1016/j.cgh.2015.09.031

Karantanos, T., Markoutsaki, T., Gazouli, M., Anagnou, N. P., & Karamanolis, D. G. (2010). Current insights in to the pathophysiology of irritable bowel syndrome. *Gut Pathogens*, *2*(1), 1-8.

Kim, Y. S., & Kim, N. (2018). Sex-Gender Differences in Irritable Bowel Syndrome. *J Neurogastroenterol Motil*, *24*(4), 544-558. https://doi.org/10.5056/jnm18082

Koloski, N., Jones, M., & Talley, N. (2016). Evidence that independent gut-to-brain and brain-to-gut pathways operate in the irritable bowel syndrome and functional dyspepsia: a 1-year population-based prospective study. *Alimentary Pharmacology & Therapeutics*, *44*(6), 592-600.

Koloski, N. A., Boyce, P. M., & Talley, N. J. (2006). Somatization an independent psychosocial risk factor for irritable bowel syndrome but not dyspepsia: a population-based study. *European journal of gastroenterology & hepatology*, *18*(10), 1101-1109.

Koloski, N. A., Jones, M., Kalantar, J., Weltman, M., Zaguirre, J., & Talley, N. (2012). The brain–gut pathway in functional gastrointestinal disorders is bidirectional: a 12-year prospective population-based study. *Gut*, *61*(9), 1284-1290.

Konturek, P. C., Brzozowski, T., & Konturek, S. (2011). Stress and the gut: pathophysiology, clinical consequences, diagnostic approach and treatment options. *J Physiol Pharmacol*, *62*(6), 591-599.

Kumaraswamy, N. (2013). Academic stress, anxiety and depression among college students: A brief review. *International review of social sciences and humanities*, *5*(1), 135-143.

Larauche, M., Mulak, A., & Taché, Y. (2012). Stress and visceral pain: from animal models to clinical therapies. *Experimental neurology*, *233*(1), 49-67.

Lautman, Z., & Lev-Ari, S. (2022). The Use of Smart Devices for Mental Health Diagnosis and Care. *Journal of Clinical Medicine*, *11*(18), 5359. https://www.mdpi.com/2077-0383/11/18/5359

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer publishing company.

Liu, L., Liu, B. N., Chen, S., Wang, M., Liu, Y., Zhang, Y. L., & Yao, S. K. (2014). Visceral and somatic hypersensitivity, autonomic cardiovascular dysfunction

and low-grade inflammation in a subset of irritable bowel syndrome patients. *J Zhejiang Univ Sci B*, *15*(10), 907-914. https://doi.org/10.1631/jzus.B1400143

Liu, Y., Liu, L., Yang, Y., He, Y., Zhang, Y., Wang, M., Chen, S., & Yao, S. (2014). A School-Based Study of Irritable Bowel Syndrome in Medical Students in Beijing, China: Prevalence and Some Related Factors. *Gastroenterology Research and Practice*, *2014*, 124261. https://doi.org/10.1155/2014/124261

Longstreth, G. F., Thompson, W. G., Chey, W. D., Houghton, L. A., Mearin, F., & Spiller, R. C. (2006). Functional bowel disorders. *Gastroenterology*, *130*(5), 1480-1491. https://doi.org/10.1053/j.gastro.2005.11.061

Lovibond, S. H. (1995). Manual for the depression anxiety stress scales. *Sydney psychology foundation*.

Mass-Hernández, L. M., Acevedo-Aguilar, L. M., Lozada-Martínez, I. D., Osorio-Agudelo, L. S., Maya-Betancourth, J. G. E. M., Paz-Echeverry, O. A., Paz-Echeverry, M. J., Castillo-Pastuzan, H. S., Rojas-Pimentel, J. C., & Rahman, S. (2022). Undergraduate research in medicine: A summary of the evidence on problems, solutions and outcomes. *Annals of Medicine and Surgery*, *74*, 103280. https://doi.org/https://doi.org/10.1016/j.amsu.2022.103280

Mearin, F., Lacy, B. E., Chang, L., Chey, W. D., Lembo, A. J., Simren, M., & Spiller, R. (2016). Bowel Disorders. *Gastroenterology*. https://doi.org/10.1053/j.gastro.2016.02.031

Mellis, C. M. (2020). How to choose your study design. *J Paediatr Child Health*, *56*(7), 1018-1022. https://doi.org/10.1111/jpc.14929

Mkize, L. P., Nonkelela, N. F., & Mkize, D. L. (1998). Prevalence of depression in a university population. *Curationis*, *21*(3), 32-37.

Mofatteh, M. (2021). Risk factors associated with stress, anxiety, and depression among university undergraduate students. *AIMS Public Health*, *8*(1), 36-65. https://doi.org/10.3934/publichealth.2021004

Naeem, S. S., Siddiqui, E. U., Kazi, A. N., Memon, A. A., Khan, S. T., & Ahmed, B. (2012). Prevalence and factors associated with irritable bowel syndrome among medical students of Karachi, Pakistan: a cross-sectional study. *BMC Res Notes*, *5*, 255. https://doi.org/10.1186/1756-0500-5-255

Newman, M. G., Basterfield, C., Erickson, T. M., Caulley, E., Przeworski, A., & Llera, S. J. (2022). Psychotherapeutic treatments for generalized anxiety disorder: cognitive and behavioral therapies, enhancement strategies, and emerging efforts. *Expert Review of Neurotherapeutics*, *22*(9), 751-770. https://doi.org/10.1080/14737175.2022.2125800

Norton, P. J. (2007). Depression Anxiety and Stress Scales (DASS-21): Psychometric analysis across four racial groups. *Anxiety, Stress, & Coping*, *20*(3), 253-265. https://doi.org/10.1080/10615800701309279

Oka, P., Parr, H., Barberio, B., Black, C. J., Savarino, E. V., & Ford, A. C. (2020). Global prevalence of irritable bowel syndrome according to Rome III or IV criteria: a systematic review and meta-analysis. *Lancet Gastroenterol Hepatol*, *5*(10), 908-917. https://doi.org/10.1016/s2468-1253(20)30217-x

Palsson, O. S., Baggish, J. S., Turner, M. J., & Whitehead, W. E. (2012). IBS patients show frequent fluctuations between loose/watery and hard/lumpy stools: implications for treatment. *Am J Gastroenterol*, *107*(2), 286-295. https://doi.org/10.1038/ajg.2011.358

Palsson, O. S., Whitehead, W. E., Van Tilburg, M. A., Chang, L., Chey, W., Crowell, M. D., Keefer, L., Lembo, A. J., Parkman, H. P., & Rao, S. S. (2016). Development and validation of the Rome IV diagnostic questionnaire for adults. *Gastroenterology*, *150*(6), 1481-1491.

Palsson, O. S., Whitehead, W. E., van Tilburg, M. A., Chang, L., Chey, W., Crowell, M. D., Keefer, L., Lembo, A. J., Parkman, H. P., Rao, S. S., Sperber, A., Spiegel, B., Tack, J., Vanner, S., Walker, L. S., Whorwell, P., & Yang, Y. (2016). Rome IV Diagnostic Questionnaires and Tables for Investigators and Clinicians. *Gastroenterology*. https://doi.org/10.1053/j.gastro.2016.02.014

Parmentier, F. B. R., García-Toro, M., García-Campayo, J., Yañez, A. M., Andrés, P., & Gili, M. (2019). Mindfulness and Symptoms of Depression and Anxiety in the General Population: The Mediating Roles of Worry, Rumination, Reappraisal and Suppression [Original Research]. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.00506

Qin, H. Y., Cheng, C. W., Tang, X. D., & Bian, Z. X. (2014). Impact of psychological stress on irritable bowel syndrome. *World J Gastroenterol*, *20*(39), 14126-14131. https://doi.org/10.3748/wjg.v20.i39.14126

Qumseya, B. J., Tayem, Y., Almansa, C., Dasa, O., Devault, K. R., Wallace, M. B., & Houghton, L. A. (2013). Su2032 Irritable Bowel Syndrome in the West Bank, Palestine: Its Prevalence and Affect of Location of Residence. *Gastroenterology*, *144*(5), S-537. https://doi.org/10.1016/s0016-5085(13)61994-0

Raosoft Inc. *Sample size calculator*. http://www.raosoft.com/samplesize.html

Raskov, H., Burcharth, J., Pommergaard, H. C., & Rosenberg, J. (2016). Irritable bowel syndrome, the microbiota and the gut-brain axis. *Gut Microbes*, *7*(5), 365-383. https://doi.org/10.1080/19490976.2016.1218585

Salari, N., Hosseinian-Far, A., Jalali, R., Vaisi-Raygani, A., Rasoulpoor, S., Mohammadi, M., Rasoulpoor, S., & Khaledi-Paveh, B. (2020). Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Globalization and health*, *16*(1), 1-11.

Seger, S., Nasharuddin, N. N. B., Fernandez, S. L., Yunus, S., Shun, N. T. M., Agarwal, P., & Burud, I. (2020). Prevalence and factors associated with irritable bowel syndrome among medical students in a Malaysian private university: a cross sectional study. *Pan Afr Med J*, *37*, 151. https://doi.org/10.11604/pamj.2020.37.151.21716

Shen, L., Kong, H., & Hou, X. (2009). Prevalence of irritable bowel syndrome and its relationship with psychological stress status in Chinese university students. *J Gastroenterol Hepatol*, *24*(12), 1885-1890. https://doi.org/10.1111/j.1440-1746.2009.05943.x

Sibelli, A., Chalder, T., Everitt, H., Workman, P., Windgassen, S., & Moss-Morris, R. (2016). A systematic review with meta-analysis of the role of anxiety and depression in irritable bowel syndrome onset. *Psychol Med*, *46*(15), 3065-3080. https://doi.org/10.1017/s0033291716001987

Smirnova, D., Cumming, P., Sloeva, E., Kuvshinova, N., Romanov, D., & Nosachev, G. (2018). Language Patterns Discriminate Mild Depression From Normal Sadness

and Euthymic State [Original Research]. *Frontiers in Psychiatry*, *9*. https://doi.org/10.3389/fpsyt.2018.00105

Sperber, A. D., Bangdiwala, S. I., Drossman, D. A., Ghoshal, U. C., Simren, M., Tack, J., Whitehead, W. E., Dumitrascu, D. L., Fang, X., & Fukudo, S. (2021). Worldwide prevalence and burden of functional gastrointestinal disorders, results of Rome Foundation Global Study. *Gastroenterology*, *160*(1), 99-114. e113.

Spillebout, A., Dechelotte, P., Ladner, J., & Tavolacci, M. P. (2019). Mental health among university students with eating disorders and irritable bowel syndrome in France. *Revue d'Épidémiologie et de Santé Publique*, *67*(5), 295-301. https://doi.org/https://doi.org/10.1016/j.respe.2019.04.056

Thompson, W. G. (2006). The Road to Rome. *Gastroenterology*, *130*(5), 1552-1556. https://doi.org/10.1053/j.gastro.2006.03.011

VandenBos, G. R. (2007). *APA dictionary of psychology*. American Psychological Association.

Wahed, W. Y. A., & Hassan, S. K. (2017). Prevalence and associated factors of stress, anxiety and depression among medical Fayoum University students. *Alexandria Journal of medicine*, *53*(1), 77-84.

Whitton, S. W., & Whisman, M. A. (2010). Relationship satisfaction instability and depression. *Journal of Family Psychology*, *24*(6), 791.

World Health Organziation. (2022). *Stress*. World Health Organization (WHO). Retrieved July 28 from https://www.who.int/news-room/questions-and-answers/item/stress

Yang, W., Yang, X., Cai, X., Zhou, Z., Yao, H., Song, X., Zhao, T., & Xiong, P. (2022a). The Prevalence of irritable bowel syndrome among Chinese university students: a systematic review and meta-analysis. *Frontiers in Public Health*, *10*, 864721.

Yang, W., Yang, X., Cai, X., Zhou, Z., Yao, H., Song, X., Zhao, T., & Xiong, P. (2022b). The Prevalence of Irritable Bowel Syndrome Among Chinese University Students: A Systematic Review and Meta-Analysis [Systematic Review]. *Frontiers in Public Health*, *10*. https://doi.org/10.3389/fpubh.2022.864721

Zamani, M., Alizadeh-Tabari, S., & Zamani, V. (2019). Systematic review with meta-analysis: the prevalence of anxiety and depression in patients with irritable bowel syndrome. *Alimentary Pharmacology & Therapeutics*, *50*(2), 132-143. https://doi.org/https://doi.org/10.1111/apt.15325

Appendix

Appendix A

استبيان القولون العصبي

الارتباط بين التوتر والقلق والاكتئاب والقولون العصبي بين طلاب جامعة فلسطينية: دراسة مقطعية

عزيزي المشارك نشكرك على اهتمامك بهذا البحث كمتطلب لنيل درجة الماجستير في تمريض البالغين. تهدف الدراسة الى احصاء انتشار التوتر والقلق والاكتئاب والقولون العصبي والارتباط بينهما، بين طلاب الجامعة العربية الأمريكية.

مشاركتك طوعية وتعاونك محل تقدير كبير. لديك الحق في الانسحاب في أي وقت أثناء عملية جمع البيانات دون قيود. لن يستغرق ملء الاستبيان أكثر من 10 دقائق. أؤكد أن إجاباتك ستبقى مجهولة وسرية وستستخدم لأغراض البحث فقط.

إذا كان لديك أي أسئلة أو استفسارات، فلا تتردد في الاتصال بفريق البحث على 0568999077

نشكرك على تعاونك ودعمك

الطالب: حسّان مصلح

بإشراف: د. دالية طوقان

- هل توافق على المشاركة في البحث؟

– نعم

القسم الأول: السمات الاجتماعية

1– **هل سبق وتم تشخيصك باحدى الأمراض التالية:** مرض التهاب الأمعاء، الفشل الكلوي، سوء الامتصاص، الاعتلال العصبي، أمراض الغدة الدرقية، العدوى الطفيلية أو البكتيرية، التهاب بطانة الرحم، أورام الأمعاء، متلازمات ما بعد الجراحة، الإيدز، داء السكري، التهاب البنكرياس المزمن، الاضطرابات النفسية، التهاب القولون العضوي والحساسي، عدم تحمل اللاكتوز، الانسداد المعوي الكاذب، الاعتلال العضلي ، خلل في القنوات الصفراوية أو حصوات

– نعم

– لا

2- اذا كانت الإجابة نعم في السؤال السابق اذكر/ي المرض:

3– **الجنس:**

– ذكر

– أنثى

4- العمر (الرقم باللغة الإنجليزية، مثل 22):

5- **الكلية:**

- كلية العلوم الإدارية والمالية
- كلية العلوم الطبية المساعدة
- كلية الفنون
- كلية طب الأسنان
- كلية الهندسة وتكنولوجيا المعلومات
- كلية الحقوق
- كلية الطب
- كلية العلوم الحديثة
- كلية الإعلام الحديث
- كلية التمريض
- كلية العلوم
- كلية علوم الرياضة
- كلية الدراسات العليا

6- **السنة الدراسة:**

- الأولى
- الثانية
- الثالثة
- الرابعة
- الخامسة فاكثر

7- **مكان السكن:**

- مع الأسرة
- لوحدك
- سكن طلاب مشترك

8- **هل أنت/ي مدخن؟**

- نعم
- لا

9- **هل هناك تاريخ مرضي في العائلة للإصابة بمتلازمة القولون العصبي؟**
- نعم
- لا

10- **عدد تناولك للوجبات السريعة؟**
- لا أتناول الوجبات السريع
- (1-2) في الأسبوع
- (3-4) في الأسبوع
- (5 أو أكثر) في الأسبوع

11- **كم مرة تستهلك/ي المشروبات المحتوية على الكافيين (مثل القهوة والشاي ومشروبات الطاقة)؟**
- أبداً
- نادراً
- أحياناً
- غالباً
- دائماً

12- **هل تمارس/ي الرياضة بانتظام؟**
- نعم
- لا

13- **هل تعاني من مشاكل في النوم؟**
- نعم
- لا

القسم الثاني: أسئلة القولون العصبي

حدد/ي النسبة المئوية للمرات المصحوبة بالألم:

1. **في آخر 3 أشهر، كم مرة عانيت من ألم في أي مكان من بطنك؟**

%0 أبدا	%10	%20	%30	%40	%50	%60	%70	%80	%90	%100 دائما

2. **كم مرة أصابك هذا الألم في بطنك في وقت قريب من التغوّط؛ إما قبله مباشرةً أو خلاله أو بعده بقليل؟**

%0 أبدا	%10	%20	%30	%40	%50	%60	%70	%80	%90	%100 دائما

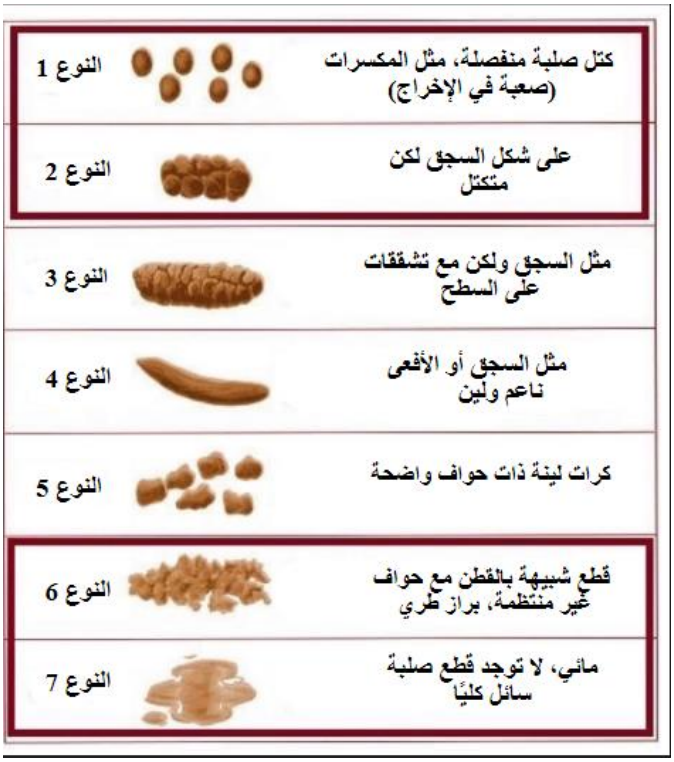
3. كم مرة أصبح برازك إما أكثر ليونة من المعتاد أو أكثر صلابة من المعتاد عندما أصابك هذا الألم؟

%0 أبدا	%10	%20	%30	%40	%50	%60	%70	%80	%90	%100 دائما

4. كم مرة أصبح إخراج البراز إما أكثر تكرارًا من المعتاد أو أقل تكرارًا من المعتاد عندما أصابك هذا الألم؟

%0 أبدا	%10	%20	%30	%40	%50	%60	%70	%80	%90	%100 دائما

5. في آخر 3 أشهر، عندما كان البراز غير طبيعي، ماذا كان يشبه عادةً؟



- عادةً إمساك (مثل النوع 1 أو 2 في الصورة)
- عادةً إسهال (مثل النوع 6 أو 7)
- كلاً من الإسهال والإمساك
- غير منطبق، لأني أبدًا أو نادرًا ما كان عندي تغوطات غير طبيعية

6. هل مضت 6 أشهر أو أكثر منذ بدأ يصيبك هذا الألم؟

– نعم
– لا

القسم الثالث: الأسئلة المتعلقة بالقلق

حدد درجة انطباق هذا الشعور عليك في الأسبوع الماضي:

0- لا ينطبق عليّ بتاتاً

1- ينطبق عليّ بعض الشيء أو قليلاً من الأوقات.

2- ينطبق عليّ بدرجة ملحوظة أو بعض الأوقات.

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.

1. وجدت صعوبة في الاسترخاء والراحة

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

2. كنت أميل الى ردة فعل مفرطة للظروف والأحداث

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

3. شعرت اني أستهلكت الكثير في الطاقة العصبية (قدرتي على تحمل التوتر العصبي)

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

4. شعرت بأني مضطرب ومنزعج

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

5. أجد صعوبة في الاسترخاء

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

6. كنت لا أستطيع تحمل أي شيء يحول بيني وبين ما أرغب في القيام به

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

7. شعرت أني أميل الى الغيظ بسرعة

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

القسم الرابع: الأسئلة المتعلقة بالتوتر

حدد درجة انطباق هذا الشعورعليك في الاسبوع الماضي:

0- لا ينطبق عليّ بتاتاً

1- ينطبق عليّ بعض الشيء أو قليلاً من الأوقات.

2- ينطبق عليّ بدرجة ملحوظة أو بعض الأوقات.

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.

1. شعرت بجفاف في حلقي

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

2. شعرت بصعوبة في التنفس (تنفس سريع، لهاث بدون القيام بمجهود جسدي مثلاً)

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

3. شعرت برجفة (باليدين مثلا)

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

4. كنت خائف من مواقف قد أفقد فيها السيطرة على أعصابي وأسبب احراجاً لنفسي

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

5. شعرت أني على وشك الوقوع في حالة من الرعب المفاجئ دون سبب

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

6. شعرت بضربات قلبي بدون مجهود جسدي (زيادة في الدقات أو عدم انتظام)

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

7. شعرت بالخوف بدون أي سبب وجيه

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

القسم الرابع: الأسئلة المتعلقة بالاكتئاب

حدد درجة انطباق هذا الشعور عليك في الاسبوع الماضي:

0- لا ينطبق عليّ بتاتاً

1- ينطبق عليّ بعض الشيء أو قليلاً من الأوقات.

2- ينطبق عليّ بدرجة ملحوظة أو بعض الأوقات.

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.

1. لم يبدو لي أن بإمكاني الإحساس بمشاعر إيجابية على الإطلاق

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

2. وجدت الصعوبة في أخذ المبادرة بعمل الأشياء

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

3. شعرت بأن ليس لدي أي شيء أتطلع اليه

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

4. شعرت بالحزن والغم

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

5. فقدت الشعور بالحماس لأي شيء

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

6. شعرت بأن قيمتي قليلة كشخص

3- ينطبق عليّ كثيراً جداً، أو معظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

7. شعرت بأن الحياة ليس لها معنى

3- ينطبق عليّ كثيراً جداً، أومعظم الأوقات.	2	1	0- لا ينطبق عليّ بتاتاً

Appendix B

Arab American University- Palestine
Deanship of Scientific Research
IRB committee
Tel: 04-241-8888, ext 1196
E-mail: irb.aaup@aaup.edu

الجامعة العربية الامريكية- فلسطين
عمادة البحث العلمي
لجنة أخلاقيات البحث العلمي
تلفون: ext 04-241-8888 1196
البريد الالكتروني: irb.aaup@aaup.edu

IRB Approval Letter

Study Title: "Association between stress, anxiety, depression and irritable bowel syndrome (IBS) among students in a Palestinian university: a cross-sectional study."

Submitted by: Hassan Hikmat Abdalraouf Musleh

Date received: 16th July 2023

Date reviewed: 6th September 2023

Date approved: 6th September 2023

Your Study titled **"Association between stress, anxiety, depression and irritable bowel syndrome (IBS) among students in a Palestinian university: a cross-sectional study."** with archived number 2023/A/141/N was reviewed by the Arab American University IRB committee and was approved on the 6th September 2023.

Ahmad Ayed, PhD
IRB Committee Member
Arab American University of Palestine

Sajed Ghawadra, PhD
IRB Committee Vice-chairman
Arab American University of Palestine

Reham Khalaf-Nazzal, MD, PhD
IRB Committee Chairman
Arab American University of Palestine

General Conditions:

1. Valid for 4 months from the date of approval.
2. It is important to inform the committee with any modification of the approved study protocol.
3. The committee appreciates a copy of the research when accomplished.

لجنة أخلاقيات البحث العلمي في الجامعة العربية الامريكية

IRB at Arab American University

Appendix C

ROME FOUNDATION, INC.	Hassan Hekmat Musleh
By: Johannah Ruddy M.Ed	By: Arab American university
Name: Johannah Ruddy M. Ed.	Name: Hassan Hekmat Musleh
Title: CO	Title: Palestine, sate of, West bank, Jenin
Date: March 26, 2023	Date: 5th January 2023.

EXHIBIT A

Description of licensed content

- **Irritable Bowel Syndrome Module**

In Arabic for Israel and English for US added 4/26/23

Added Rome IV Diagnostic Questionnaire in Arabic for Israel on 3/28/23

Appendix D

Arab American University Faculty of Graduate Studies		الجامعة العربية الأمريكية كلية الدراسات العليا

نموذج طلب تسهيل مهمة بحثية لرسالة الماجستير أو الدكتوراه

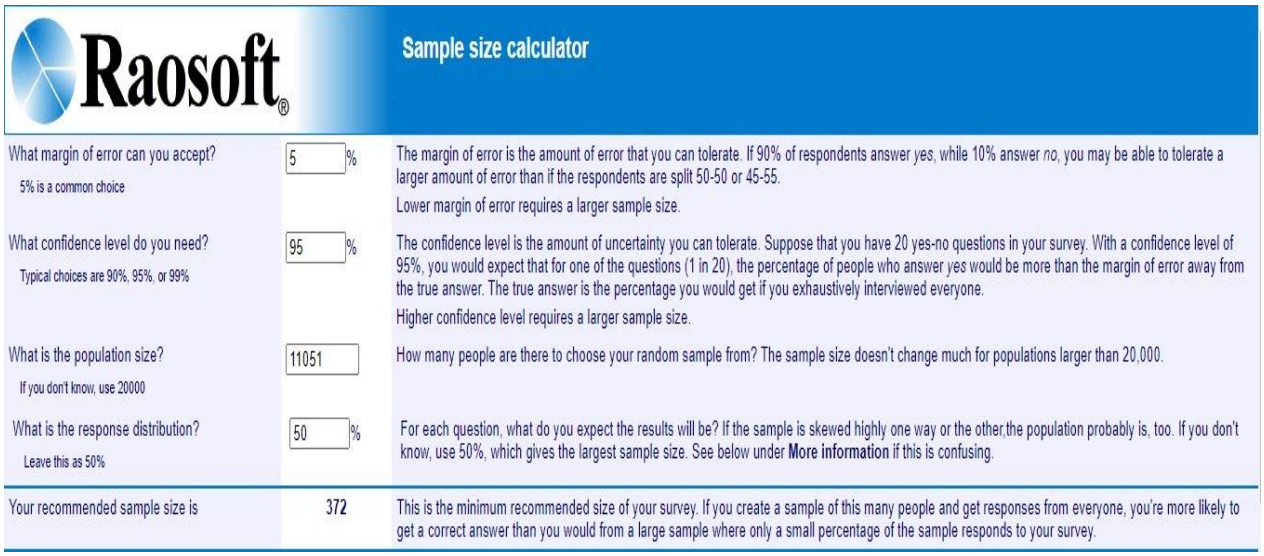
الطلبة الاعزاء

تحية طيبة وبعد،

تهديكم كلية الدراسات العليا في الجامعة العربية الأمريكية أطيب التحيات، وبالإشارة الى الموضوع أعلاه، يرجى التكرم بتعبئة المعلومات المطلوبة بالجدول أدناه ليتسنى إعداد كتاب المهمة البحثية، مع التنويه أنه سيتم إرسالها خلال ثلاثة أيام عمل من تاريخ استلام المعلومات المطلوبة من قبلكم، وفي حال التأخر في إرسال المعلومات المطلوبة أدناه أو إرسال المعلومات ناقصة يتحمل الطالب/ة مسؤولية التأخر في استلام المهمة البحثية.

• **اسم الطالب/ة الرباعي وفقا لسجلات الجامعة**	حسان حكمت عبد الرؤوف مصلح
• **الرقم الجامعي**	202113121
• **اسم البرنامج**	ماجستير في تمريض البالغين
• **الدرجة (ماجستير أو دكتوراه)**	ماجستير
• **عنوان أطروحة الماجستير أو الدكتوراه**	الارتباط بين التوتر والقلق والاكتئاب ومتلازمة القولون العصبي بين طلاب جامعة فلسطينية: دراسة مقطعية.
• **اسم الدكتور المشرف/ المشرفين**	د. دالية طوقان
• **الى من سيتم توجيه الرسالة (عادةً توجه الرسالة الى من يهمه الأمر)** في حال طلب مخاطبة شخص محدد يرجى ارسال اسم الشخص،المسمى الوظيفي له واسم المؤسسة	الى من يهمه الأمر
• **لغة الرسالة (عربي أو انجليزي)**	انجليزى
• **تاريخ إرسال المعلومات المطلوبة**	26/09/2023
• **آلية استلام الرسالة من قبلك (الكترونيا او ورقيا)**	الكترونيا

Appendix E



Raosoft®

Sample size calculator

What margin of error can you accept? 5% is a common choice	5 %	The margin of error is the amount of error that you can tolerate. If 90% of respondents answer *yes*, while 10% answer *no*, you may be able to tolerate a larger amount of error than if the respondents are split 50-50 or 45-55. Lower margin of error requires a larger sample size.
What confidence level do you need? Typical choices are 90%, 95%, or 99%	95 %	The confidence level is the amount of uncertainty you can tolerate. Suppose that you have 20 yes-no questions in your survey. With a confidence level of 95%, you would expect that for one of the questions (1 in 20), the percentage of people who answer *yes* would be more than the margin of error away from the true answer. The true answer is the percentage you would get if you exhaustively interviewed everyone. Higher confidence level requires a larger sample size.
What is the population size? If you don't know, use 20000	11051	How many people are there to choose your random sample from? The sample size doesn't change much for populations larger than 20,000.
What is the response distribution? Leave this as 50%	50 %	For each question, what do you expect the results will be? If the sample is skewed highly one way or the other,the population probably is, too. If you don't know, use 50%, which gives the largest sample size. See below under **More information** if this is confusing.
Your recommended sample size is	372	This is the minimum recommended size of your survey. If you create a sample of this many people and get responses from everyone, you're more likely to get a correct answer than you would from a large sample where only a small percentage of the sample responds to your survey.

ملخص الدراسة

خلفية الدراسة: متلازمة القولون العصبي هي واحدة من اضطرابات الجهاز الهضمي الوظيفية الأكثر شيوعا التي يتم الإبلاغ عنها بين طلبة الجامعة وترتبط بعدة عوامل فسيولوجية ونفسية.

الهدف: تهدف هذه الدراسة إلى التعرف على مرض القولون العصبي والاكتئاب والقلق والتوتر والارتباط بينهما لدى طلبة الجامعة الفلسطينيين.

الطرق: استخدمت الدراسة تصميمًا تحليليًا كميًا مقطعيًا، حيث تم اختيار عينة مكونة من 372 طالبًا جامعيًا من 13 كلية في الجامعة العربية الأمريكية في فلسطين وتم ملء استبيان ذاتي يحتوي على معايير(روما 4) لتشخيص القولون العصبي، وأداة مقياس الاكتئاب والقلق والتوت.

النتائج: 51.3% من المشاركين ذكور، بمتوسط عمر 22.6 سنة. وكان معظمهم من كليات الطب والعلوم الصحية، وأغلبهم من التمريض (40.9%). الأغلبية ليس لديهم تاريخ عائلي للإصابة بالقولون العصبي (73.7%). باستخدام معايير (روما 4)، وكان متوسط مجموع نقاط اسئلة القولون العصبي 9، مع كون النوع (غير محدد) هو النوع الفرعي الأكثر شيوعًا (38.7٪)، يليه النوع (المختلط) (23.0٪) ولنوع (الإمساك) (22.3٪). أظهر ما يقرب ثلث المشاركين مستويات طبيعية من الاكتئاب (34.7٪)، والقلق (30.1٪)، والتوتر (37.9٪). وشملت النتائج ذات الدلالة الإحصائية على ارتفاع درجات القولون العصبي بين الإناث، والطلاب الأكبر سنا، وأولئك الذين لديهم تاريخ عائلي من القولون العصبي، وارتفاع استهلاك الكافيين، واضطرابات النوم. القلق والتوتر تنبأ بدرجات القولون العصبي، مع وجود ارتباطات متبادلة ذات دلالة إحصائية بين التوتر والقلق والاكتئاب ومتلازمة القولون العصبي.

الاستنتاج: تتشابه الدراسة الحالية مع غيرها من الدراسات العالمية والعربية في عدة أوجه فيما يتعلق بمعظم العوامل المرتبطة بمرض القولون العصبي لدى طلبة الجامعة، وخاصة من حيث العوامل النفسية. ويوصى بإجراء المزيد من الدراسات على عينة أكبر تحتوي على مؤسسات تعليمية متعددة في فلسطين.

الكلمات المفتاحية: القولون العصبي، متلازمة القولون العصبي، التوتر، القلق، الاكتئاب، طلاب الجامعة/الكلية.