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Prevalence and Determinants of Perceived Stress among Undergraduate Respiratory Therapy
Students in Saudi Arabia

By

Abdulmajeed Abdulaziz Baogbah

Under the Direction of
Ralph “Chip” Zimmerman, PhD, RRT, RRT-NPS, FAARC

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of
Master of Science in Health Sciences

in

The Department of Respiratory Therapy

in

The Byrdine F. Lewis College of Nursing and Health Professions

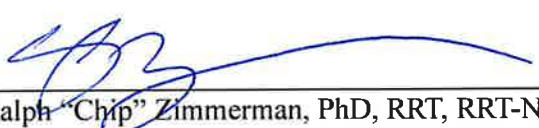
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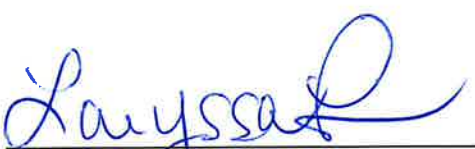
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This thesis, Prevalence and Determinants of Perceived Stress among Undergraduate Respiratory Therapy Students in Saudi Arabia, by Abdulmajeed Abdulaziz Baogbah was prepared under the direction of the Master's Thesis Advisory Committee of the Respiratory Therapy Department at Georgia State University. It is accepted by the committee in partial fulfillment of requirements for the Master of Science degree in Respiratory Therapy at Byrdine F. Lewis College of Nursing and Health Professions, Georgia State University. The Master's Thesis Advisory Committee, as representatives of the faculty, certifies that this thesis has met all standards of excellence and scholarship as determined by the faculty.




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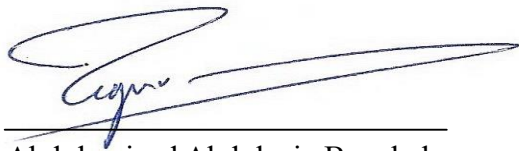
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DEDICATION

I stand at the threshold of a remarkable milestone in my academic journey. First and foremost, we thank the Almighty God for his grace, blessing, and guidance throughout our lives.

To my beloved parents (Dr. Abdulaziz and Hanan), this accomplishment would not have been possible without your continued support, encouragement, and endless love throughout my journey in life and for what lies ahead. Mom and Dad, I cannot thank you enough; I am eternally grateful and will forever cherish your role in my life.

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Abdulmajeed Abdulaziz Baogbah

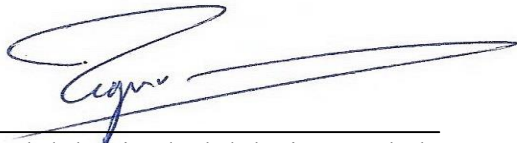
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A handwritten signature in blue ink, appearing to read 'Abdulmajeed', with a long horizontal flourish extending to the right.

Abdulmajeed Abdulaziz Baogbah

Spring, 2024

Prevalence and Determinants of Perceived Stress among Undergraduate Respiratory Therapy
Students in Saudi Arabia

By

Abdulmajeed Abdulaziz Baogbah

Under the Direction of Professor Ralph “Chip” Zimmerman

ABSTRACT

Background: Stress is a common phenomenon among health sciences students, severely impacting students in different ways. Similar to other students, undergraduate Respiratory Therapy (RT) students are at a high risk of stress exposure that may harm their well-being. To enhance students' well-being, it is essential to examine the prevalence and determinants of perceived stress among undergraduate RT students. **Purpose:** This research aims to assess the prevalence of perceived stress and identify variable sources of stress among undergraduate RT students in Saudi Arabia (SA). **Methods:** A cross-sectional study was conducted during the academic year (2023-2024) to explore the prevalence and determinants of perceived stress. Data was collected through an anonymous self-administered survey consisting of 46 questions, including demographics, the Perceived Stress Scale (PSS-14), and sources of stress survey. **Results:** A total of 384 participants completed the survey. The study findings revealed a high prevalence of stress among students (60.9%), with a mean PSS score of 28.5 ± 9.2 among participants. Females significantly reported higher levels of stress than males ($p < .001$). Furthermore, there was a significant difference in the mean PSS score among students at different academic levels ($p < .001$). Similarly, there was a significant difference in mean PSS score among different categories of GPAs ($p < .011$). No significant mean PSS difference was found among marital statuses and geographical regions. Academic stress stood out as a prominent source of stress among participants. The PSS correlated positively with all domains of stressors. It had a moderate positive correlation with the academic domain ($r = .512$, $p < .001$), a low positive correlation with the psychosocial domain ($r = .312$, $p < .001$), health domain ($r = .150$, $p = .003$), and with financial strain related to financial instability ($r = .196$, $p < .001$). All stress domains had a statistically significant regression coefficient to predict stress ($p < .001$). **Conclusion:** Stress is prevalent among undergraduate RT students in SA. Therefore, institutions should establish robust feedback mechanisms and prioritize mental health and counseling services resources, considering students' multifaceted challenges.

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Chapter I

Introduction

The early introduction of the Respiratory Therapy (RT) profession was in the 1940s (Kacmarek, 2013). Respiratory therapy professionals are specialized healthcare practitioners trained to provide healthcare therapeutics to patients with respiratory diseases (Almeshari et al., 2022). The role of the Respiratory Care (RC) profession expanded from delivering oxygen to post-surgical patients to include further clinical demands such as diagnostic and therapeutic intervention and mechanical ventilator management (Becker et al., 2018).

In 1987, in Saudi Arabia (SA), the Military Hospital and the Faculty of Allied Health Professions at Loma Linda University launched a scientific satellite program related to respiratory therapy. The program was designed to provide 3-years of RC instruction and clinical training. In 1988, the Prince Sultan School of Military Health Sciences launched the first National Academic Diploma in RT in the Eastern Province of SA. There has been a revolution in RC programs in both the private and government academic sectors to meet the growing need for RC services in SA since 2005 (Al-Otaibi & AlAhmari, 2016). However, many barriers are reported that work to prevent the development of the RC profession (Almeshari et al., 2022).

In a recent paper investigating the status of RC education in SA, twenty-three educational institutions were identified as offering RC programs. However, not all institutions were actively enrolling students and providing instruction. Several barriers to development were reported, such as a shortage of staff, a lack of postgraduate programs, and ineffective communication among institutions. Furthermore, institutions offering RC programs are unevenly distributed nationwide, resulting in limited RC services in several regions (Almeshari et al., 2022).

Problem Area

Despite popular opinion, stress is not always harmful or a consequence of something terrible (Selye, 1965). It is the body's reaction to any changes in the surrounding environment that require adaptation or response, and the body reacts to these changes with physical, mental, and emotional responses (Lyrakos, 2012; Selye, 1965). Everyone experiences stress. However, stress can be categorized into two types based on whether it positively or negatively impacts the individual. Eustress, or positive stress, helps us accomplish our daily tasks, achieve hard-to-reach goals, and adapt to change, which leads to positive outcomes. Distress, or negative stress, arises when an individual's demands surpass their coping abilities. If prolonged, it is seen as a contributor to producing negative consequences. In medical theory, a stress agent can be used to protect against disease, and conversely, it can also lead to medical complications (Selye, 1965).

Moreover, previous studies classified stressors into three major groups: academic, psychological, and health-related (Gazzaz et al., 2018). Stress among students is a common phenomenon as the academic years represent a significant transition in all areas of life, including friendships, romantic relationships, education, career, and, often, geographic location (Aljohani et al., 2021; Morey & Taylor, 2019). College students must acknowledge that they are subjected to various stress triggers that adversely affect their health, academic performance, and career achievement (Al Rasheed et al., 2017; Gazzaz et al., 2018). In addition, it may worsen mental health and physical well-being if mismanaged (Mirza et al., 2021). However, what is stressful for one individual may not be so for another, and while everyone feels stress at times, the effects and reactions to stress can differ among individuals (Lyrakos, 2012).

The etiology of stress among college students during the academic journey arises from different variables, including academic pressure stemming from factors such as course

requirements, exams, workload, and competition with other students. One variable that is attributed to stress is the social factor. For example, lack of leisure time, meeting parents' expectations, and establishing new personal relationships (Bhargava & Trivedi, 2018). According to Aljohani et al. (2021), stress from clinical practice has been reported as a significant factor in stress among nursing students. Clinical sources of stress include unfamiliarity with the clinical environment, lack of knowledge and professional ability, lack of familiarity with the history and medical terms, a heavy workload, being in an unfamiliar situation, making errors with patients, and handling advanced technical instruments (Aljohani et al., 2021).

Researchers have long identified symptoms of stress as a lack of energy, use of over-the-counter medications, high blood pressure, depression, increased appetite, difficulty concentrating, irritability, nervousness, and anxiety. People who experience any of these factors can become victims of stress. However, it may depend on how the individual assesses the situation and how well that person is adaptable. While the negative impact of stress on an individual may vary from one student to another, it depends on prior exposure and the individual's resilience. According to research findings, an individual's perception determines whether a stressor has a deleterious effect, i.e., whether it causes physical or psychological stress symptoms. The lack of attention to student stress may also stem from the lack of a direct correlation between students' presence in the institution and the quality of their education. Extensive research has found that stress relates to how a person assesses a situation and their coping strategies (Bhargava & Trivedi, 2018).

Evidence shows that medical students are believed to have enormous stressors as they advance in their academic years (Gazzaz et al., 2018). The reason for the high level of stress can be due to the rapid expansion in the field because of the numerous research and enormous sum of information in medical sciences, which medical students are expected to learn, memorize within a

limited amount of time, and use in different circumstances in their careers (Altannir et al., 2019; Gazzaz et al., 2018). Specific studies on medical school graduates reported an association between psychological stress among these students and suboptimal patient care (Mirza et al., 2021).

Statement of Problem

Stress, a common phenomenon among health sciences students, severely impacts the education process. Similar to other students, undergraduate RT students are at a high risk of exposure to stress that harms their health. Currently, no published studies have examined the prevalence and determinants of perceived stress among undergraduate RT students in SA.

Purpose of The Study

Understanding how stress and various factors affect college students is an important concern. Thus, this study aimed to measure the prevalence of perceived stress and identify variable sources of stress among undergraduate RT students in SA.

Research Questions

The study aimed to answer the following questions:

1. What is the prevalence of stress among undergraduate RT students in SA using the Perceived Stress Scale-14 (PSS-14) questionnaire?
2. What is the association between sociodemographics and the prevalence of stress and sources of stress among undergraduate RT students in SA?
3. How are different sources of stress associated with the prevalence of stress among undergraduate RT students in SA?
4. What is the most common source of stress experienced by undergraduate RT students in SA?

Significance of The Study

This study is the first to investigate the prevalence and determinants of perceived stress among undergraduate RT students in SA. This research is noteworthy because it identifies the elements contributing to stress among college students. As a result, this study will provide information on the unpleasant consequences of stress among college students in SA, which will help them develop stress management and prevention strategies and wellness programs for college students. Additionally, it will increase awareness of the need for universities to provide education and adopt policies to help students avoid and cope with stress.

Definition of Words and Terms

RC: Respiratory Care

RT: Respiratory Therapy

SA: Saudi Arabia

PSS: Perceived Stress Scale

Limitations

There are several limitations to this study. First, the study was largely centered on undergraduate RT students, potentially limiting its generalizability to other students in other specialties. Secondly, this study may report bias as we adopted a cross-sectional convenience sampling technique. Relying on self-report scales can introduce biases, such as social desirability or recall biases, which might influence participants' responses. Additionally, it captured data on a single point in time, which did not account for potential changes in stress levels or factors influencing stress over time. Furthermore, factors like physical health, previous mental health diagnoses, or family history were not controlled for, which could play a significant role in

perceived stress. Lastly, this study did not assess coping strategies among participants, as these strategies provide a broader view of how different coping methods affect stressed individuals.

Summary

This study aimed to investigate the prevalence of stress and identify stress factors related to undergraduate RT students in SA. Researchers have completed several studies to determine the prevalence of stress among students in various professional fields across various countries and to identify the most common stressors. Understanding stress among students is important to designing stress prevention measures and wellness initiatives for them. To this end, the prevalence of stress among undergraduate RT students in SA must be examined.

Chapter II

Review of The Literature

This literature review represents a significant and thorough understanding of previously conducted studies to explore the prevalence and determinants of perceived stress among undergraduate students and to formulate adequate background. The literature's foremost purpose is to explain the stress problem from different aspects and identify the gap that defines the motivation for the current investigation. Data were collected from several databases, including PubMed, CINHALL, and EBSCOhost. The following combinations of keywords were used for the search process: perceived stress, stress component, sources of stress, stress-associated factors, stressors, undergraduate medical students, undergraduate nursing students, undergraduate healthcare students, and undergraduate health sciences students. This chapter is organized into paragraphs related to reviewed articles as follows:

- Stress
- Perceived Stress among Undergraduate Students
- Perceived Stress among Medical Students
- Perceived Stress among Nursing Students
- Perceived Stress among Health Sciences Students
- Coping Strategies for Stress

Stress

Stress is identified as an outcome of changes in the surrounding environment (Satpathy et al., 2021). The meaning of this term has been extended to refer to physiological structural changes in the body. The broad use of the term stress is equated with undesired consequences (Selye, 1965).

However, the theory distinguishes two different types of stress, i.e., eustress and distress. Eustress is described as a positive perspective linked to well-being benefits. Previous investigations demonstrated a profound association between an adequate stress level and motivation and accomplishment. By contrast, distress arises in situations where stress is prolonged, and an individual's capabilities to overcome or adapt are insufficient (Yf & Yt, 2018). Nonetheless, the negative form of stress, termed distress, has been identified as contributing to physiological and serious medical complications (Fasoro et al., 2019).

Every human being is vulnerable to stress. However, the factors contributing to stress and the responses to it may differ from one individual to another (Lyrakos, 2012). This chapter contextualizes the literature by providing background on stress affecting university students, which has been demonstrated to emerge from different aspects. Shreds of evidence are presented in the following paragraphs.

Perceived Stress among Undergraduate Students

Concerning other factors causing stress, academic-related factors were reported as a prominent source among students. This claim was supported by a study that revealed a rate of 60% of students dropping out (Teh et al., 2015). In another study, 50% of students reported academic-related factors as a significant source of stress during their consultation with mental health services (Yasin & Dzulkifli, 2011). These findings agreed with a study conducted in Malaysia, where most students—63.3%—were unsatisfied with their academic performance (Teh et al., 2015). Similarly, in Europe (Lyrakos, 2012) and India, academic-related factors were ranked as the fifth most common source of stress (Bhargava & Trivedi, 2018).

Many variables impact the stress level experienced by international university students as they are susceptible to new cultures, traditions, and sometimes new languages, as are students who study in their own country as they are experiencing a new environment and way of living (Lyrakos, 2012). According to the National College Health Assessment, finance is the second most common source of stress among university students, scoring thirty-four percent (Morey & Taylor, 2019). In a multicultural European survey, Lyrakos (2012) investigated how everyday situations affect university students, including stress. The data were gathered twice at various time points. The stress level at the second point was significantly lower than at the first. This finding was in line with other referenced studies. However, British participants were found to be more stressed in the second study compared to others from different European nationalities. Although the study failed to provide a definite explanation, Lyrakos (2012) argued that educational fees are a considerable factor, as they are far more expensive in the United Kingdom than in other European countries. Bhargava & Trivedi (2018) identified finance as a source of stress among students from the perspective of fulfilling requirements to maintain their lifestyle. The study further indicated that financial-related factors were the third-most common cause of stress, scoring 72.55% (Bhargava & Trivedi, 2018). Unlike in the Philippines, financial-related issues were the highest as an intrapersonal factor (Bulo & Sanchez, 2014). A qualitative study in Texas, United States, revealed that college students consider finance a stressful source. Although 17 out of 20 college students in the study received financial aid from their families, most interviewees said they had to work to earn money (Morey & Taylor, 2019). In Malaysia, students from low-income families are more vulnerable to stress (Teh et al., 2015). In response to interviews, a study in the Philippines indicated that conflicts in the family environment are related to financial aid and meeting family expectations as a source of stress (Bulo & Sanchez, 2014).

During college, students are expected to present high performance throughout the entire academic year. To achieve that, students may be under constant pressure, making the academic environment stressful and affecting their social lives. In a survey of Indian students, Bhargava & Trivedi (2018) found that relationships are the highest factor causing stress. This result might be explained by the analysis of Lyrakos (2012), which identified social support as a potential variable impacting the level of stress that negatively correlated with stress. Similarly, a Malaysian study found a consistent link between social life and stress, in which socially satisfied students had a lower possibility of perceived stress (Teh et al., 2015).

Perceived Stress among Health and Non-Health Students

Medical students are more likely to suffer from perceived stress than their peers in different non-health fields of study (Votmer et al., 2012). A survey of female Saudi students from health and non-health specialties documented that 64% experienced moderate stress levels. Respectively, a similar proportion was documented among Thai medical students (64%) (Saipanish, 2003) and undergraduate health science students in Ethiopia (63.5%) (Worku et al., 2020). In the Saudi study, the data showed that Information Technology students reported the lowest perceived stress, whereas the highest reported stress among medical and dentistry students. The study further provided information about stressors, where most participants identified examinations as the highest factor (Al Rasheed et al., 2017). This finding is in line with that of Ethiopia, where students are found to be continuously under pressure to maintain good grades (Worku et al., 2020). A similar proportion of perceived stress was reported in Thai (Saipanish, 2003) and Malaysian (Awadh et al., 2013), with respect to the Saudi study, which incorporated female students from different specialties and academic years. In contrast, the Thai study was conducted among medical school students, and the Malaysian study among Master of Pharmacy and non-pharmacy students.

Compared to students in the United Kingdom, Saudi students appear to perceive higher stress levels (Al Rasheed et al., 2017). On the contrary, in another significant survey in Saudi Arabia investigating the variation of stress among medical and non-medical students, Mirza et al. (2021) found that 38% of the participants demonstrated stress as a psychological-related factor. However, the study found no significant differences between the two populations in the prevalence of stress. The proportion of non-medical students who experienced stress was 38.08 percent compared to 37.66 percent of medical students. The study further associated family conflicts with perceived stress (Mirza et al., 2021). Family is also considered to be a potential source of stress. Mirza et al. (2021) found a significant association between parents' status and the prevalence of perceived stress. Likewise, Worku et al. (2020) reported high parental expectations.

Perceived Stress among Medical Students

Many papers identified perceived stress as a rising trend among medical students (Priyadharshini et al., 2021). A comparison between medical students and their peers in different academic fields revealed that medical students are more likely to suffer from perceived stress than their peers in non-health fields of study (Votmer et al., 2012). The stress level is expected to rise as students advance through the academic years (Fasoro et al., 2019; Hill et al., 2018; M et al., 2018). However, a German study by Heinen et al. (2017) carried out on first-year medical students found a significantly higher stress level compared with another German study previously conducted on second-year medical students. One of the explanations for this line of reasoning is that during their first year of medical school, medical students encounter life challenges as they transition to the adolescent phase, such as living independently (Heinen et al., 2017). This finding aligned with a survey of Nigerian and Saudi Arabian medical students (Fasoro et al., 2019; Kulsoom & Afsar, 2015). Furthermore, the high prevalence of stress among medical students was

associated with inadequate preparedness for the clinical environment (Fasoro et al., 2019). Similar results were reported in Saudi Arabia among pre-clinical medical students (Alotiby et al., 2021).

Data from several studies identify academic-related factors as a prominent source of perceived stress (Hill et al., 2018; Priyadharshini et al., 2021). A cross-sectional study conducted across India among students from all years of medical college reported that the students experienced severe stress. The highest prevalence was reported in the first and final year of college. The high stress level among the two groups was linked to academic-related factors, including, but not limited to, the expenses and rigorous curriculum, and the frequency of exams (Brahmbhatt et al., 2013; Solanky et al., 2012). A similar factor was reported among medical students in India (Swaminathan et al., 2015) and Nigeria (Fasoro et al., 2019). Similarly, medical students in the United States considered the ratio of the pace of the curriculum to study time as a source of stress (Hill et al., 2018). This is consistent with previous studies, which explained this by the rapidly growing research in the medical field, which, in turn, medical students are expected to comprehend, recall, and apply on demand (Gazzaz et al., 2018; Hill et al., 2018). Another reported factor that was linked to perceived stress is that medical students find themselves struggling with a heavy workload while cycling through a busy schedule lacking relaxation time (Brahmbhatt et al., 2013; Gazzaz et al., 2018; Heinen et al., 2017; Hill et al., 2018). This was also associated with procrastination and a lack of proper time management (M et al., 2018; Solanky et al., 2012). However, a study by Hill et al. (2018) found that even though students prioritized college, they reported a lack of personal time and reported that as a potential source of stress affecting their social lives. Medical students' challenges during their academic life include summative and formative examinations (Gazzaz et al., 2018). Additionally, difficulties in adequate literacy of medical terminology were considered a remarkable determinant of stress among first-year medical

students (Solanky et al., 2012). In further analysis of academic-related stress, Priyadharshini et al. (2021) and Hill et al. (2018) found that stress prevalence was high in medical students in individuals due to the presence of group activities, and extracurricular volunteering. In addition, the American study reported that medical students were found to be stressed due to unrelated specialty requirements (Hill et al., 2018).

The environment in medical school is stressful and could negatively contribute to students' well-being. This is explained by the fact that medical school is a competitive rather than cooperative environment (Brahmbhatt et al., 2013; Solanky et al., 2012). Additionally, Fasoro et al. (2019) linked competitiveness to the large number of students enrolled in medical school when the number of students surpasses the facilities available. The study by Hill et al. (2018) demonstrated that medical students further identified the medical school environment as unfriendly to students (e.g., unsupportive). Psychological factors such as fear of failing examinations and dissatisfaction at not obtaining the desired score were further identified as sources of interference with the stress level they experienced (Hill et al., 2018; Solanky et al., 2012). As mentioned, Fasoro et al. (2019) suggested that a high level of stress could explain the transition to the adolescence phase; students may have been adjusting to being independent and becoming accustomed to a new environment. This might be explained by the fact, for example, that the students living off-campus are financially responsible for rent and food supplies (Asfaw et al., 2021). These findings were reported in a similar study as the most psychological factor that elevated the prevalence of stress (Swaminathan et al., 2015). Moreover, much of the available literature on perceived stress points to financial-related factors such as educational loans as a potential source of stress; however, a study by Gazzaz et al. (2018) found no significant differences in various groups as medical students receive a monthly payment from the Ministry of Education. Furthermore, medical students in

Saudi Arabia are provided with substances, including residence and food, on minimal charges (Altannir et al., 2019; Gazzaz et al., 2018). A study in Nigeria indicated that students receiving low monthly allowances reported high stress levels (Fasoro et al., 2019).

Likewise, several studies have identified a lack of social support as a source of stress among medical students, who are at risk of unpleasant life situations (Asfaw et al., 2021). This is similar to a study in Saudi Arabia (Gazzaz et al., 2018). This finding supports the conclusion that age is a predictor of stress level (M et al., 2018). Moreover, several studies have found stress to be a significant factor associated with loneliness. This finding also negatively affected medical students' career choices (Brahmbhatt et al., 2013; Zheng et al., 2021). However, several studies found that medical students worrying about future positions as professional physicians was a source of stress (Gazzaz et al., 2018; Hill et al., 2018; Solanky et al., 2012). A recent study has found evidence that links ethnicity with stress. This association may be explained by the socio-cultural aspect, as multiple studies have clarified that the enrolled students have different backgrounds (Brahmbhatt et al., 2013; Fasoro et al., 2019). Moreover, M et al. (2018) suggested that the lower mean of perceived stress in the study compared to the one conducted by Brahmbhatt et al. (2013) is because of the fact that the city in which the university in question is located is considered a cultural capital, which positively contributes to the quality of life (M et al., 2018). A further factor that emerged from the data was interpersonal conflict, which affects their self-esteem (Fasoro et al., 2019). This social aspect supports the work of other studies linking unreasonable parental expectations with significant perceived stress (Brahmbhatt et al., 2013). However, a study conducted among Indian medical students demonstrated a lower stress level if their parents were in the medical field. This finding significantly differed among medical students in Nepal, where the prevalence of stress was higher (M et al., 2018).

Stress is considered an impediment to academic achievement. According to a Saudi Arabian study, medical students encounter high baseline perceived stress. Moreover, when an examination is approaching, the stress level tends to be significantly increased (Kulsoom & Afsar, 2015). Examination scores for the students encountering stress were not reported in the study. However, another study conducted in Saudi Arabia revealed that students with a high prevalence of stress were susceptible to lower exam scores <80 compared to those with a low level of stress (Gazzaz et al., 2018). The study indicated that the English language, as a potential psychosocial contributor, elevated the perceived stress as students used to adopt the Arabic language in the school curriculum (Gazzaz et al., 2018; Kulsoom & Afsar, 2015). Adopting a similar factor, Solanky et al. (2012) found that the majority of first-year medical students experience stress and consider language as a factor as they come from vernacular medium and different geographical areas (M et al., 2018; Solanky et al., 2012). Another reported stress factor was the continuous assessment of students and the grading system (Hill et al., 2018; Kulsoom & Afsar, 2015). Data from several studies have identified behavioral factors such as internet addiction, as well as addiction to pornography, time management, and procrastination, as having a significant attribution with perceived stress (Hakami et al., 2021; Swaminathan et al., 2015). A recent Ethiopian study discovered a significant relationship between cigarette and alcohol consumption and perceived stress (Asfaw et al., 2021).

Regarding health-related factors, sleep hygiene and nutrition were reported as significant factors, in addition to body mass index (Asfaw et al., 2021; Hill et al., 2018). Several studies have postulated a convergence between dietary habits and lifestyles and stress (Brahmbhatt et al., 2013; Hill et al., 2018). Obese and overweight medical students perceived stress significantly in Egypt and Saudi Arabia (Brahmbhatt et al., 2013; Gazzaz et al., 2018). This finding is consistent with

data provided by Hill et al. (2018) in which medical students reported having difficulties maintaining regular physical activity.

During their academic journey, medical students are exposed to the clinical environment. Several studies report that this transition from classes to clinical rotations is a crucial source of stress (Altannir et al., 2019; Brahmbhatt et al., 2013; Fasoro et al., 2019; Oku et al., 2015). It has been reported that stress experienced by medical students negatively interferes with services offered to patients (Brahmbhatt et al., 2013). The literature further explained the association between the prevalence of stress and clinical courses, as medical students are subjected to numerous responsibilities, including interaction with severely ill and/or end-stage patients. In addition, language barriers and cultural variables affect communication with patients (Heinen et al., 2017; Hill et al., 2018). A study by Hill et al. (2018) reported in students' own words that, in the clinical year, students experience stress linked with continuous subjective assessment. A survey of medical students has failed to demonstrate that clinical students experience higher stress levels than preclinical students (Gazzaz et al., 2018). Similar data was reported in Malaysia and Egypt (Gazzaz et al., 2018). In contrast, Youssef (2016) and Saipanish (2003) found a significant difference in perceived stress between the two groups. Gazzaz et al. (2018) suggested that the differences in the significance of stress between the two groups compared to other studies are due to gender, where the participants in Gazzaz et al. (2018) study were male. Additionally, participants' characteristics, including cultural variables and educational environments, and the instrument used for measurement. Moreover, a reasonably consistent piece of evidence of an association between stress and clinical involvement is that medical students have to prepare for residency programs, which also include the choice of specialty (Altannir et al., 2019).

Perceived Stress among Nursing Students

Several studies have investigated the prevalence and sources of stress among nursing students (A & S, 2017; Aljohani et al., 2021; Rathnayake & Ekanayaka, 2016; Zhao et al., 2015). In a survey of Saudi bridging and undergraduate nursing students, the study demonstrated the extent to which age negatively correlates with stress. The study further revealed significant differences in factors leading to stress between the two groups. Academic-related stressors included heavy curriculum, examinations, advanced subjects, and clinical classes for undergraduates (Aljohani et al., 2021). This factor was the most frequently reported cause of stress in two studies in China (Zhao et al., 2015) and Pakistan (A & S, 2017). Furthermore, several Arab studies have suggested that language barriers pose an academic challenge (Aljohani et al., 2021; Rabea et al., 2018). These academic-related stressors were found to be influencing the ability of nursing students to balance their academic and personal recreational time in Saudi Arabia and Pakistan, which represented a source of stress (A & S, 2017; Aljohani et al., 2021). These academic factors were found to overlap with clinical classes, creating time management issues and thus causing stress.

Another factor of interest is the clinical-related stressors. Undergraduate nursing students demonstrated a severe prevalence of stress related to clinical classes. Similar findings were reported in Malaysia (Masilamani et al., 2019) and China (Watson et al., 2013). This gave rise to several reasons. Nursing students reported medical errors and responsibilities for the patients as sources of intensifying stress (A & S, 2017; Aljohani et al., 2021). This was in line with findings reported by Singh et al. (2013). Furthermore, faculties expectations were reported as a potential source of stress. This is because, as nursing students advance in their academic level, they are expected to behave and act with professionalism (Aljohani et al., 2021; Zhao et al., 2015). This

finding agrees with that obtained by A & S (2017), in which 87.3% reported stress when receiving negative feedback from senior staff. In a similar context, most nursing students in Pakistan considered physicians' criticism and humiliating attitude as situations that may contribute to stress (A & S, 2017). However, in addition to clinical-related stressors, a study conducted in Singapore revealed financial-related stressors (Lim et al., 2009).

Moving on to personal and social-related stressors, nursing students in Saudi Arabia reported adapting to a new living environment away from home (Alghamdi et al., 2019; Aljohani et al., 2021). Similarly, an Egyptian study also pointed out this challenge (Sharma & Kaur, 2011). This factor was also found to negatively impact the support the students sought from their families, which was considered a source of stress (Aljohani et al., 2021). Furthermore, a Pakistani study indicated that 84% of nursing students indicated that career advancement prospects were a source of stress (A & S, 2017). Similarly, in Saudi Arabia, nursing students were found to be in fear of poor job opportunities (Aljohani et al., 2021). Furthermore, Saudi Arabian studies argued that the prevalence of stress could result from the community's negative perception of nursing students (Aljohani et al., 2021; Gazzaz et al., 2018).

Stress Coping Strategies

If mishandled or neglected, stress can contribute to several significant health and psychological complications (Finkelstein et al., 2007; Gazzaz et al., 2018). Undergraduate students experience several significant life situations that may act as driving factors for stress. As a result, students find themselves in a position of demand, where they are required to establish coping strategies (Lyrakos, 2012). A study in the United States found that different coping strategies significantly influence the level of stress among medical students. In other words, students who reported a lower stress level were engaged in different activities (Hill et al., 2018). These coping

strategies and their responses may differ from student to student. For example, in a study conducted in India (M et al., 2018), medical students were found to adopt sleep as their first coping strategy; however, in the United States, this coping strategy was found to not significantly impact the level of stress among students (Hill et al., 2018).

Another coping strategy is substance use, such as alcohol, which was reported in the United States among medical students (Hill et al., 2018) and in Malaysia among nursing students as the least common coping strategy (Masilamani et al., 2019). However, both studies found no significant differences in the levels of stress. In addition, Hill et al. (2018) found that those who socialize without alcohol reported lower stress levels. Similarly, two studies reported socializing with friends or family as the most commonly adopted strategy to reduce stress (Bhargava & Trivedi, 2018; Morey & Taylor, 2019). These findings confirm the significant positive correlation between alcohol and stress in Ethiopia (Asfaw et al., 2021). Investigating further coping mechanisms, religious practices were reported as the first coping mechanism in two Malaysian studies (Ab Latif & Mat Nor, 2019; Masilamani et al., 2019). In a Chinese study, the most reported coping approach was transference; for example, but not limited to, physical exercise (Zhao et al., 2015). Although several coping mechanisms were addressed in several studies, the responses remained variable; thus, understanding stress and its profound effects is necessary to improve personal, psychological, and physical well-being.

Chapter III

Methodology

This study explored the prevalence and determinants of perceived stress among Undergraduate RT Students in SA. The study was completed using an online survey consisting of demographic questions and the PSS-14, in addition to the potential sources of stress developed by (Sreeramareddy et al., 2007). This chapter gives a review of the methods and procedures to be used to conduct this study.

Research Questions

The study aimed to answer the following questions:

1. What is the prevalence of stress among undergraduate RT students in SA using the PSS-14 questionnaire?
2. What is the association between sociodemographics and the prevalence of stress and sources of stress among undergraduate RT students in SA?
3. How are different sources of stress associated with the prevalence of stress and sources of stress among undergraduate RT students in SA?
4. What is the most common source of stress experienced by undergraduate RT students in SA?

Instrumentations

This section describes various instruments utilized to conduct the study. In addition to sociodemographics (age, geographical region, gender, marital status, academic level, and current GPA), two different tools were used to collect data to measure the prevalence and potential sources of stress. The survey consisted of the PSS-14 questionnaire to measure the stress among

participants. The PSS is a globally used tool to measure perceived stress levels, and it consists of 14 items, seven of which represent positive situations while the other seven represent negative situations. These items were designed for participants to evaluate their feelings and thoughts on a particular situation on a five-point Likert scale from 0 (never) to 4 (very often) (Cohen et al., 1983). Total scoring of PSS includes reversing the seven positive items (e.g., 0=4, 1=3, 2=2, 3=1, and 4=0) and then computing the sum of all 14 items. The PSS has a total score ranging from 0 to 56, the higher the total score, the higher the level of stress, and vice versa. In accordance with previous studies (Brahmbhatt et al., 2013; Gazzaz et al., 2018; Yf & Yt, 2018), a score of 28 was considered a cut-off value to distinguish stressed and non-stressed participants, in which participants with a score of <28 were classified as non-stressed, while those with a score of ≥ 28 were classified as stressed.

The questions regarding potential sources of stress included in the survey were developed by Sreeramareddy et al. (2007). The survey was further modified and reviewed by the research committee, and it included 27 items categorized into four key domains: academic (10 items), psychosocial (11 items), health (5 items), and financial (1 item). These items were designed so participants could evaluate the frequency of their occurrence. The frequency of occurrence was reported on the original scale from 1 (never) to 5 (always).

Study Design and Setting

The study adopted a cross-sectional design to investigate the prevalence and determinants of perceived stress among undergraduate RT students in SA. The data collection process was carried out via an anonymous self-administered survey during the academic year (2023-2024). In a recent study by Almeshari et al. (2022), twenty-three departments of RT were identified, four of which reported in-active status. All identified departments are offering a four-year RT program

starting from the second year in college to the fifth year. In the first year of college (preparatory year) students concentrate on basic scientific courses before they are allocated to the RT program. After allocation to RT programs, the second year is a preclinical and consists primarily of basic scientific courses and an introductory course to RT, while the remaining two years include subjects related to RT programs and clinical hours in different hospital settings. During the fifth year, which is the internship year, the students fully engage in clinical training without taught classes.

Study Population and Sampling Technique

This study targeted undergraduate RT students in SA at governmental and private RT programs. Further, the study employed a convenience sampling technique for the targeted population. There was no inclusion of first-year college students due to their focus on basic science and they are not transitioned into specialized programs that align with their chosen major (e.g., Respiratory Therapy Program). Post-graduate RT students were excluded.

Data Collection

After receiving the Institutional Review Board (IRB) approval, students were given a self-administered survey voluntarily. Further, the survey was sent to the chairs of RT departments at governmental and private universities and interns' supervisors in hospitals (targeting internship-year students) and then distributed by them to targeted students (distributed via university email). The survey included a cover page, including the purpose of the study, and informed consent. The confidentiality and anonymity of the participants and obtained data were assured. There was no collection or identification of personal information, and the collected data were analyzed by the principal and student investigators. Additionally, the contact information of the study principal investigator was provided for any additional inquiries regarding the study.

Data Analysis

Data management and analyses were performed using Statistical Package for the Social Sciences (SPSS) version 29.0.1.0, SPSS Inc. in Chicago, IL. Descriptive and analytical statistics were calculated and presented in frequencies, percentages, means, and standard deviations. Independent samples t-tests are utilized to assess gender-based differences in perceived stress and domains of stressors. One-way ANOVA was used to measure differences in perceived stress between different demographic variables and domains of stressors, bivariate Pearson correlations were performed to examine the interrelationships among the variables of interest, and a multiple regression analysis was conducted to predict perceived stress based on domains of stress.

Chapter IV

Results

This study aimed to measure the prevalence of stress and identify potential sources of stress among undergraduate RT students in SA. This chapter intends to provide a statistical analysis of the data collected from participants. This study targeted all undergraduate RT students across Saudi Arabia. Participants were recruited using a convenience sampling technique. An online link to the survey was sent to the heads of RT departments and internship supervisors (governmental and private universities and hospitals, to target interns) to distribute the survey. By the end of the survey period, data had been collected from 384 students who voluntarily agreed to participate in this study. This chapter is further designed to present the results of the following research questions using both descriptive and inferential statistical tests on self-reported questionnaires:

1. What is the prevalence of stress among undergraduate RT students in SA using the PSS-14 questionnaire?
2. What is the association between sociodemographics and the prevalence of stress and sources of stress among undergraduate RT students in SA?
3. How are different sources of stress associated with the prevalence of stress and sources of stress among undergraduate RT students in SA?
4. What is the most common source of stress experienced by undergraduate RT students in SA?

Demographic Findings

The sample consisted of a total of 384 participants. The mean (SD) age of participants was 22.04 years ($SD \pm 2.152$), ranging from 18 to 36 years. Regarding gender distribution, the majority were male ($n = 222$, 57.8%), while female participants comprised 42.2% ($n = 162$). Most participants were single ($n = 372$, 96.9%), with a smaller percentage being married ($n = 11$, 2.9%), and only one participant reported being divorced or widowed (0.3%). The geographical regions of participants were as follows: central region ($n = 81$, 21.1%), eastern region ($n = 72$, 18.8%), western region ($n = 137$, 35.7%), northern region ($n = 14$, 3.6%), and southern region ($n = 80$, 20.8%).

Regarding academics, students were classified based on their academic level into four levels: second-year students ($n = 69$, 18%), third-year students ($n = 76$, 19.8%), fourth-year students ($n = 120$, 31.3%), and internship-year students ($n = 119$, 31%). To categorize participants based on their current GPA and classify them according to academic performance, the distribution was as follows: 46.1% ($n = 177$) had a GPA between 4.50 and 5.00, 45.8% ($n = 176$) had a GPA ranging from 3.50 to 4.49, 7.3% ($n = 28$) had a GPA from 2.50 to 3.49, and a minority (0.8%, $n = 3$) had a GPA below 2.5.

Table 1 Characteristics of the study population.

Age, years (mean, \pm SD)		22.04 \pm 2.15
Variable	Category	N (%)
Gender	Male	222 (57.8%)
	Female	162 (42.2%)
Marital status	Single	372 (96.9%)
	Married	11 (2.9%)
	Divorced/ widowed	1 (0.3%)
Geographical regions	Central	81 (21.1%)
	Eastern	72 (18.8%)
	Western	137 (35.7%)
	Northern	14 (3.6%)
	Southern	80 (20.8%)
Academic level	Second year	69 (18%)
	Third year	76 (19.8%)
	Fourth-year	120 (31.3%)
	Internship year	119 (31%)
Current GPA	4.50 – 5.00	177 (46.1%)
	3.50 – 4.49	176 (45.8%)
	2.50 – 3.49	28 (7.3%)
	< 2.5	3 (0.8%)

Reliability statistics

Reliability analysis was conducted on the two scales used in the questionnaire: Perceived Stress Scale (PSS-14) and Sources of Stress. Cronbach's alpha values for the two scales are presented in Table 2. The PSS-14 has 14 items with an excellent internal consistency with Cronbach alpha reliability of 0.805. Similarly, the sources of stress scale demonstrated a reliability of .0857.

Table 2 Reliability Statistics.

Scale Name	Number of Items	Cronbach's Alpha
PSS-14	14	0.805
Sources of Stress	27	0.857

Data Analysis Procedures

A battery of statistical tests was conducted to examine associations and distinctions among sociodemographic and stress-related variables. Independent samples t-tests were utilized to assess gender-based differences in perceived stress and academic stress, while ANOVA tests were employed to investigate regional disparities in academic and psychosocial stress levels. Academic year-based ANOVA was conducted to explore variations in stress levels across different academic levels, and GPA-based ANOVA was used to probe stress differences based on GPA ranges. These statistical procedures collectively contribute to a comprehensive analysis of the interplay between sociodemographic factors and stress levels within the study population. Regression tests were used to measure the effect of the different subdomains of perceived stress.

The Prevalence of Stress

The Perceived Stress Scale (PSS-14) is a tool designed to measure the degree to which situations in one's life are appraised as stressful. The scores on the PSS-14 can range from 0 to 56, with higher scores indicating higher levels of perceived stress. The total PSS score of 28 was considered as a cut-off value to differentiate between stressed and non-stressed participants, in which individuals with a score of <28 were classified as non-stressed, while those with a score of ≥ 28 were classified as stressed. The overall prevalence of stress was 60.9% (n=234), while 39.1% (n=150) were non-stressed, with a mean of 28.5 among all participants. This highlights a significant prevalence of stress among the participants, with over half of the respondents categorizing themselves as stressed. The findings presented in our study revealed a significantly higher prevalence of stress among females (n=130, 33.9%) compared to male students (n=104, 27.1%). There was a significant difference in the mean PSS scores among students at various academic levels. Specifically, as students progressed through their academic years, there was a

noticeable increasing trend in the PSS scores. The mean PSS score for second-year students was 25.57, while third-year, fourth-year, and internship-year students had mean scores of 26.73, 27.65, and 32.3, respectively. Moreover, the mean PSS score was significant among students with different categories of GPAs ($P < .001$). No significant mean PSS difference was found among marital statuses and geographical regions (Table 4).

Table 3 Overall stress status.

Stress status			
Stressed		Non-Stressed	
N	%	N	%
234	60.9%	150	150%

Table 4 Comparison of PSS score among different variables.

Factors	N	Mean	SD	<i>p</i>-value
Gender				
Male	222	26	8.7	<.001*
Female	162	32	8.7	
Marital status				
Single	372	28.45	9.1	<.59
Married	11	31	11.3	
Divorced/ widowed	1	33	9.2	
Geographical region				
Central	81	27.46	12.0	<.23
Eastern	72	30.4	7.1	
Western	137	28.85	9.6	
Northern	14	29.1	6.0	
Southern	80	27.3	6.8	
Academic level				
Second year	69	25.57	11.4	<.001*
Third year	76	26.7	8.7	
Fourth year	120	27.65	8.0	
Internship year	119	32.3	8.1	
Current GPA				
4.50 – 5.00	177	25.0	9.3	<.001*
3.50 – 4.49	176	31.4	8.3	
2.50 – 3.49	28	32.2	6.9	
< 2.5	3	26.3	2.8	

Sources of Stress

The stress questionnaire is structured into three domains: academic, psychosocial, health, and financial domains. Each category consists of several items (academic: 10 items, psychosocial: 11 items, health: 5 items, and financial with one item), each with a numerical rating of one to five. There was a noticeable difference in mean scores across the different stress categories. The academic domain stands out with the highest mean score of $2.94 \pm .83$, suggesting that of all the domains measured, the academic domain was the most prevalent source of stress for the participants (Table 5).

Table 5 Means of stress domains among participants.

Stress domain	Mean	SD
Academic	2.94	.83
Psychosocial	2.21	.70
Health	2.02	.76
Financial	2.36	1.38

Association between the Prevalence of Stress and Sources of Stress

Bivariate Pearson correlations were performed to examine the interrelationships among the domains of interest (Table 6). The PSS-14 showed significant positive correlations with all domains. It had a moderate positive correlation with the academic domain ($r = .512, p < .001$), a low positive correlation with the psychosocial domain ($r = .312, p < .001$), health domain ($r = .150, p = .003$), and with financial domain ($r = .196, p < .001$). The academic domain was significantly and positively associated with the psychosocial domain ($r = .330, p < .001$), health domain ($r = .213, p < .001$), and financial domain ($r = .188, p < .001$). Of note, the psychosocial domain exhibited a strong positive correlation with the health domain ($r = .666, p < .001$) and a moderate

correlation with the financial domain ($r = .442, p < .001$). Additionally, the health domain had a moderate positive correlation with the financial domain ($r = .402, p < .001$). Overall, these results indicate that while all variables are interrelated, the strength of their relationships varies. Particularly, the psychosocial domain and health domain shared the strongest correlation among all the variable pairs, suggesting a potential overlapping or compounding impact of these domains.

Table 6 Interrelationships among variables.

		Perceived Stress Scale	Academic Domain	Psychosocial Domain	Health Domain	Financial strain
Perceived Stress Scale	Pearson	1	.512**	.312**	.150**	.196**
	Correlation					
	Sig. (2-tailed)		.000	.000	.003	.000
	N	384	384	384	384	384
Academic Stress	Pearson	.512**	1	.330**	.213**	.188**
	Correlation					
	Sig. (2-tailed)	.000		.000	.000	.000
	N	384	384	384	384	384
Psychosocial domain	Pearson	.312**	.330**	1	.666**	.442**
	Correlation					
	Sig. (2-tailed)	.000	.000		.000	.000
	N	384	384	384	384	384
Health domain	Pearson	.150**	.213**	.666**	1	.402**
	Correlation					
	Sig. (2-tailed)	.003	.000	.000		.000
	N	384	384	384	384	384
Financial strain	Pearson	.196**	.188**	.442**	.402**	1
	Correlation					
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	384	384	384	384	384

** Correlation is significant at the 0.01 level (2-tailed).

Effect of Stress Domains on Perceived Stress

A multiple regression analysis was conducted to predict perceived stress, as measured by the PSS-14, based on four predictors: academic domain, psychosocial domain, health domain, and financial domain (assessed by the question: "Does the financial instability bother you?"). The overall model was statistically significant and accounted for approximately 29.4% of the variance in perceived stress, $R^2 = .294$, adjusted $R^2 = .287$, $F(4, 379) = 39.492$, $p < .001$. The standard error of the estimate was 7.80502.

Table 7 Multiple regression analysis to predict stress.

Regression Model	
Predictors	
(Constant)	23.338 (1.712)***
Academic Domain	5.044 (0.507)***
Psychosocial Domain	2.728 (0.805)**
Health Domain	-1.354 (0.709)
Financial Domain	0.442 (0.342)
Model Summary	
R	.542
R^2	.294
Adjusted R^2	.287
Std. Error of the Estimate	7.80502
ANOVA	
df	4 (Regression), 379 (Residual), 383 (Total)
Sum of Squares	9623.219 (Regression), 23088.028 (Residual)
Mean Square	2405.805 (Regression), 60.918 (Residual)
F	39.492***

Note. Values in parentheses represent standard errors. * $p < .001$. ** $p < .01$.

The regression coefficient for the academic domain was statistically significant, $b = 5.044$, $SE = 0.507$, $\beta = .456$, $t(379) = 9.953$, $p < .001$. For every one-unit increase in the academic domain, there are an estimated 5.044 units in the PSS-14, holding all other predictors constant. The psychosocial domain also had a statistically significant regression coefficient, $b = 2.728$, $SE =$

0.805, $\beta = .209$, $t(379) = 3.391$, $p = .001$. For every unit increase in the psychosocial domain, there's an estimated increase of 2.728 units in the PSS-14 when other predictors are held constant. The regression coefficient for the health domain was not statistically significant at the conventional .05 level, $b = -1.354$, $SE = 0.709$, $\beta = -.112$, $t(379) = -1.910$, $p = .057$, but it approached significance. This suggests that for every unit increase in the health domain, there might be an estimated decrease of 1.354 units in the PSS-14, with other predictors held constant. The financial domain did not have a statistically significant regression coefficient, $b = .442$, $SE = 0.342$, $\beta = .063$, $t(379) = 1.290$, $p = .198$. Academic and psychosocial domains are significant predictors of perceived stress. While the health domain approached significance, the financial domain did not significantly predict perceived stress in this model. Researchers and practitioners should particularly consider the impact of academic and psychosocial domains when addressing perceived stress in similar populations.

Differences in Sociodemographic Variables

Differences in sociodemographic variables were tested using various inferential statistics. Independent samples t-test and one-way ANOVA have been conducted. For most results, only statistically significant patterns are reported hereinafter for conciseness. There was a significant difference in the mean of academic domain among genders ($P < .001$). The mean of female students was 3.2. There are no significant differences in the means of psychosocial and health domains between genders. There were no significant differences in the means of all domains among different marital statuses. Additionally, there were significant differences ($P < .001$) in the means in all domains among students from various geographical regions. In the eastern region, students' mean of psychosocial domain was the highest (2.44) compared to other students from other areas. For the health domain, the mean of students from the northern region was the highest at 2.48. There

were significant regional differences in the academic domain ($p < .001$), with the central region scoring the highest mean at 3.14. The differences in means in all groups of academic levels were significant ($P < .001$) in academic, psychosocial, and health domains. Fourth-year students scored the highest mean in academic and psychosocial domains, 2.9 and 2.3, respectively, whereas third-year students scored the highest in health-related stressors 2.16. Further, there was a significant difference ($P < .001$) in the means of academic domain among students with various GPAs; students with GPAs of 2.5–3.49 scored the highest mean of 3.1. No significant differences related to psychosocial and health domains were found among students with different GPAs. The mean values of the three categories of stressors among demographics are presented in the following tables: academic domain (Table 8.0), psychosocial domain (Table 8.1), and health domain (Table 8.2).

Table 8.0 Academic domain among demographics.

Stressors	Mean	SD	<i>p</i>-value
Academic domain			
Gender			<.001*
Male	2.70	.81	
Female	3.27	.74	
Academic domain			
Marital status			<.37
Single	2.93		
Married	3.14		
Divorced/ widowed	3.90		
Academic domain			
Geographical region			<.041*
Central	3.14	.77	
Eastern	3.00	.70	
Western	2.91	.97	
Northern	2.92	.63	
Southern	2.74	.73	
Academic domain			
Academic level			<.001*
Second year	2.93	.94	
Third year	2.58	.83	
Fourth year	2.90	.75	
Internship year	3.22	.75	
Academic domain			
Current GPA			<.001*
4.50– 5.00	2.70	.86	
3.50 – 4.49	3.15	.76	
2.50 – 3.49	3.19	.63	
< 2.5	2.33	.75	

*Significant

Table 8.1 Psychosocial domain among demographics.

Stressors	Mean	SD	<i>p</i>-value
Psychosocial domain			
Gender			<.82
Male	2.21	.74	
Female	2.20	.66	
Psychosocial domain			
Marital status			<.48
Single	2.20	.70	
Married	2.24	.81	
Divorced/ widowed	2.54	.	
Psychosocial domain			
Geographical region			<.001*
Central	1.95	.51	
Eastern	2.44	.67	
Western	2.17	.76	
Northern	2.40	.56	
Southern	2.28	.74	
Psychosocial domain			
Academic level			<.001*
Second year	1.82	.45	
Third year	2.29	.83	
Fourth year	2.30	.75	
Internship year	2.29	.61	
Psychosocial domain			
Current GPA			<.086
4.50– 5.00	2.13	.74	
3.50 – 4.49	2.25	.67	
2.50 – 3.49	2.40	.51	
< 2.5	2.72	1.6	

*Significant

Table 8.2 Health domain among demographics.

Stressors	Mean	SD	<i>p</i>-value
Health domain			
Gender			<.23
Male	2.06	.78	
Female	1.96	.73	
Health domain			
Marital status			<.51
Single	2.20	.70	
Married	1.83	.76	
Divorced/ widowed	1.40	.	
Health domain			
Geographical region			<.001*
Central	1.63	.58	
Eastern	2.20	.67	
Western	2.01	.84	
Northern	2.48	.49	
Southern	2.16	.75	
Health domain			
Academic level			<.001*
Second year	1.44	.48	
Third year	2.16	.74	
Fourth year	2.12	.83	
Internship year	2.15	.68	
Health domain			
Current GPA			<.14
4.50– 5.00	1.94	.80	
3.50 – 4.49	2.07	.71	
2.50 – 3.49	2.10	.67	
< 2.5	2.73	1.2	

*Significant

Chapter V

Discussion

The purpose of academic research is not just to find out new information, but also to contextualize these findings within the broader scope of existing knowledge. The discussion chapter serves as a bridge between the raw data collected and the overarching implications of these results in the real world. In this chapter, we will delve into the nuances of the findings of our study, examining the prevalence and determinants of perceived stress among undergraduate RT students in SA. By comparing our results with existing literature, we aim to pinpoint similarities, discrepancies, and potential reasons for the patterns observed. Furthermore, we will contemplate the broader ramifications of our findings, especially for educators, policymakers, and the students themselves. By the end of this chapter, we hope to provide a comprehensive understanding of the stress landscape among RT students and offer insights that could guide future interventions and research in this domain. The present study was designed to assess stress and identify stressors among undergraduate RT students in SA, guided by the following questions:

1. What is the prevalence of stress among undergraduate RT students in SA using the PSS-14 questionnaire?
2. What is the association between sociodemographics and the prevalence of stress and sources of stress among undergraduate RT students in SA?
3. How are different sources of stress associated with the prevalence of stress and sources of stress among undergraduate RT students in SA?
4. What is the most common source of stress experienced by undergraduate RT students in SA?

The Prevalence of Stress

A growing body of evidence suggests that stress significantly impacts health field students, affecting various aspects of their lives, including academic, professional, and personal achievements (Gazzaz et al., 2018; M et al., 2018; R. Siraj et al., 2023; Sreeramareddy et al., 2007). The findings of this study indicated a high prevalence of stress; more than two-thirds (60.9%) of the respondents were stressed. With respect to the different measurement tools, this high prevalence is in line with those of previous studies conducted on medical, health science, and nursing students (Aljohani et al., 2021; Gazzaz et al., 2018; Kulsoom & Afsar, 2015; Loureiro et al., 2008; Worku et al., 2020). Furthermore, a previous Saudi Arabian study involving 1001 undergraduate RT students showed high-to-moderate stress levels among students, and stress is significantly associated with progression in the academic years (R. Siraj et al., 2023). Similarly, our report revealed that stress is positively correlated with advancement in the academic years. This finding also agrees with studies involving nursing and medical students (Aljohani et al., 2021; M et al., 2018). Several factors could explain this observation. First, the complexity of academic materials increases as students progress to higher educational levels. Additionally, RT students are actively involved in clinical settings, assuming various patient care responsibilities. Such responsibilities may elicit feelings of intimidation as they are required to fulfill tasks and assist in procedures.

Association between sociodemographics and the Prevalence of Stress

The prevalence of stress among female students was higher than their male peers. This variation was statistically significant. In a similar case, R. Siraj et al. (2023) explained that gender differences in perceiving stress are due to the fact that females may experience challenges fitting into the RT profession, which in Saudi Arabia is a male-dominant field, experiencing potential

gender bias or discrimination (R. Siraj et al., 2023). R. Siraj et al., (2023) further elaborate that females may encounter societal pressure regarding their ability to balance personal responsibilities and professional commitments. Additionally, females were found to invest emotions when handling critically ill patients (R. Siraj et al., 2023).

Moreover, our findings showed a significant association between academic achievement, as evaluated by current GPA, and the occurrence of stress. In other words, students with a lower GPA were more likely to be stressed than those with a higher GPA. Although the comparability might be limited for several factors such as field of study, a study involving 176 medical students found that students who scored low in their last exam were stressed (Gazzaz et al., 2018). However, a study involving health sciences students found that students striving to maintain high grades are almost twice as susceptible to stress (Worku et al., 2020). No significant difference exists in perceiving stress among geographical regions and marital statuses.

Sources of Stress

When considering findings within the three domains of stress (academic, psychosocial, and health), the highest stressors exhibited by students were academic-related. This result is consistent with data from previous studies involving medical and nursing students (Aljohani et al., 2021; Gazzaz et al., 2018; M et al., 2018; Sreeramareddy et al., 2007). Within the academic domain, the frequency of examinations contributes the most as a determinant of stress. This finding broadly supports the work of other studies involving medical students (Saipanish, 2003; Shah et al., 2010). Performance in practical rotations, becoming a respiratory therapist, and preparing for the board examination were also seen as stressors. These results may be explained by the fact that RT students, during their clinical engagement phase, are transitioned from a structured educational environment to an unfamiliar professional environment in which they are expected to recall and

apply a tremendous amount of knowledge. Further, R. Siraj et al. (2023) argued that due to the greater responsibilities that interns encounter, they find themselves in stressful situations where they have to act with autonomy without or with minimum immediate supervision. These challenges, coupled with the demanding workload, uncertainty about the future of becoming a therapist, and thorough preparation for board examination, could potentially contribute to a stressful internship year.

Another important stress domain of concern is psychosocial; the second most significantly reported determinant of stress after the academic domain. This finding is consistent with that of Sreeramareddy et al. (2007). Within the psychosocial domain, worrying about the future was the highest stressor among students, followed respectively by high parental expectations, a lack of entertainment in educational institutions and surrounding areas, and a lack of recreational time. Some of these factors align with previous studies involving medical students (Brahmbhatt et al., 2013; Sreeramareddy et al., 2007). A study exploring the relationship between stress and satisfaction among RT students showed a high satisfaction rate with the profession (R. Siraj et al., 2023). This was explained by the high demand for a profession in which students have opportunities to secure their employment immediately after graduation (R. Siraj et al., 2023). However, in the current report, we found that most psychosocial stress is related to worrying about the future. A possible explanation for these results may be the lack of adequate clarity and guidance provided to students in understanding personal goals after completing the RT program, especially with the newly accredited RT post-graduate diploma program, which may require competitive criteria for admission, thereby aggravating stress (Almeshari et al., 2022).

The third domain of stress is the health domain. Our results agree with the findings of other studies, in which sleeping difficulties and food quality were identified as the most reported

stressors (Asfaw et al., 2021; Hill et al., 2018; Swaminathan et al., 2015). Our analysis showed that sleep hygiene was most common among interns. A possible explanation for this might be due to the demanding nature of the profession and the irregularity of schedules, especially since interns are expected to work as full-time employees (R. A. Siraj et al., 2022). Regarding nutritional habits, a recent study in Egypt found that obese and overweight medical students perceive stress and anxiety significantly (Abdel Wahed & Hassan, 2017). No significant difference was found in the financial strain domain among participants. The reasons for this are that the government alleviates the burden of financial tuition as education is free for all Saudi nationals, and students receive a monthly stipend from the Ministry of Education.

Association between the Prevalence of Stress and Sources of Stress

The data showcases that the PSS correlated positively with all other examined domains. This implies a compounded effect where increased perceived stress is paralleled by heightened academic, psychosocial, health, and financial challenges. This is in line with the work of Ross et al. (1999), who found that different stress factors can coalesce, amplifying the overall stress experience. The substantial correlation between psychosocial stressors and health-related issues aligns with the research of Thoits (2010), suggesting that personal challenges and health issues can often be deeply interconnected, especially in a demanding environment like academia.

Effect of Stress Domains on Perceived Stress

The present study's multi-factorial analysis to predict perceived stress based on various stress types is consistent with the broader literature on stress determinants. As previously documented by Welle & Graf (2011), academic stress plays a significant role in shaping students' overall stress perceptions. In line with the present study's findings, they also noted that for each increase in the academic domain, the overall perceived stress for students increased proportionally.

Finally, the prominence of the psychosocial domain as a predictor of overall perceived stress aligns with the findings of Turner & Avison (2003), who reported that psychosocial stressors, such as interpersonal conflicts or worries about the future, substantially amplify overall stress perceptions. findings that emphasized financial strain as a significant contributor to overall stress among young adults. This variance might be attributed to contextual or demographic differences across the studies.

Conclusion

The levels of perceived stress among undergraduate RT students were high, with the academic domains as a prominent factor, followed by psychosocial and health domains. Within these three domains, the most common determinants of stress were worrying about the future, frequency of examination, performing in practical, becoming RT, and preparation for the board examination. Therefore, moving beyond traditional assessment methods and adopting creative evaluation methods in an effort to facilitate appropriate coping mechanisms will broaden the range of opportunities for students to enhance their educational journey.

Implication of The Study

The findings of this study present common challenges that students may encounter during the course of their education. Their awareness and acknowledgment of these hurdles empower them to develop coping strategies. This study provides insight into the prevalence and determinants of stress among undergraduate RT students in Saudi Arabia. Such work can inform urgent interventions from decision-makers to develop tailored programs for academic, psychosocial, and health support, promoting students' academic experience and overall well-being. Given that academic stress emerged as the most significant concern, educational institutions should consider investing in stress-reducing interventions, such as mindfulness training, counseling services, and

academic support. A significant proportion of participants were concerned about their future. Career counseling and mentorship programs can guide students and alleviate some of these concerns. With sleeping difficulties being a primary health-related concern, colleges and universities can promote wellness programs focusing on sleep hygiene, time management, and relaxation techniques.

Strengths and Limitations of The Study

To the best of our knowledge, this is the first study to explore the prevalence and determinants of perceived stress among undergraduate RT students in Saudi Arabia. A vital strength of the present study was the inclusion of undergraduate RT students from different regions across SA. However, this project was limited in several ways. First, the study is largely centered on students, potentially limiting its generalizability to other populations such as working professionals or older adults. Secondly, this study may report bias as we adopted a cross-sectional convenience sampling technique. Relying on self-report scales can introduce biases, such as social desirability or recall biases, which might influence participants' responses. Additionally, it captures data at a single point in time, which doesn't account for potential changes in stress levels or factors influencing stress over time. Furthermore, factors like physical health, previous mental health diagnoses, or family history weren't controlled for, which could play a significant role in perceived stress. Lastly, this study did not assess coping strategies among participants, as these strategies provide a broader view of how different coping methods affect stressed individuals.

Recommendations for Further Research Work

Future studies should consider diversifying the sample to include a broader age range, multiple occupations, and varied socio-economic backgrounds. Adopting a longitudinal study design can provide insights into how stress and its influencing factors evolve over time. Cultural

nuances can play a pivotal role in stress perception and coping mechanisms. Future research should delve deeper into cultural influences on stress. Instead of just understanding stress, it would be beneficial to understand how different individuals cope with it and which strategies are most effective. Furthermore, investigating how regional variations, both within and across countries, impact stress could provide rich insights. In the modern age, technology plays a significant role in students' lives. Understanding its impact, both positive (e.g., online support groups) and negative (e.g., social media-induced stress), is crucial. Based on the findings, research should not just identify stressors but also test potential interventions and their effectiveness in alleviating stress.

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**Appendix A: Questionnaire to Measure and Identify the Prevalence and Determinants of
Perceived Stress among Undergraduate RT students in SA.**

Demographic Data:

This section combines short written response (Q1) and multiple-choice questions (Q2-Q6). Please read each question carefully and answer.

1. What is your age?
2. Geographical Region:
 - ☐ Central
 - ☐ Eastern
 - ☐ Western
 - ☐ Northern
 - ☐ Southern
3. Gender:
 - ☐ Male
 - ☐ Female
4. Marital Status
 - ☐ Married
 - ☐ Single
5. Academic Level
 - ☐ 2nd year
 - ☐ 3rd year
 - ☐ 4th year
 - ☐ Internship year
6. Current GPA
 - ☐ 4.50 -5.00
 - ☐ 3.50 – 4.49
 - ☐ 2.50 – 3.49
 - ☐ < 2.50

PSS-14

For each question choose from the following alternatives:

Scaling: 0 = Never; 1 = Almost Never; 2 = Sometimes; 3 = Fairly often; 4 = Very often

No.	During the last month, how often have you thought or felt a certain way	Never	Almost never	Sometimes	Fairly often	Very often
6	In the last month, how often have you been upset because of something that happened unexpectedly?					
7	In the last month, how often have you felt that you were unable to control the important things in your life?					
8	In the last month, how often have you felt nervous and "stressed"?					
9	In the last month, how often have you dealt successfully with irritating life hassles?					
10	In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?					
11	In the last month, how often have you felt confident about your ability to handle your personal problems?					
12	In the last month, how often have you felt that things were going your way?					
13	In the last month, how often have you found that you could not cope with all the things that you had to do?					
14	In the last month, how often have you been able to control irritations in your life?					
15	In the last month, how often have you felt that you were on top of things?					
16	In the last month, how often have you been angered because of things that happened that were outside of your control?					
17	In the last month, how often have you found yourself thinking about things that you have to accomplish?					
18	In the last month, how often have you been able to control the way you spend your time?					
19	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?					

STRESSORS

Consult the stressors that are given below. Indicate the frequency with which you experienced each stressor in past years and how it impacted you. Select the answer that you think is correct for you.

ACADEMIC STRESSORS

20. Academic curriculum (Does the vastness of your curriculum bother you?):

Never	Rarely	Sometimes	Often	Always

21. Preparation for the board examination (a headache for you?):

Never	Rarely	Sometimes	Often	Always

22. Performance in practicals (handling patients/ performing procedures/ others – does it really matter to you?):

Never	Rarely	Sometimes	Often	Always

23. Competition with peers (Does the good performance of your friend put you under stress?):

Never	Rarely	Sometimes	Often	Always

24. Lack of special guidance from faculty (Do you look for any special attention other than regular classes?):

Never	Rarely	Sometimes	Often	Always

25. Dissatisfaction with the class lectures (Are you really benefiting from those?):

Never	Rarely	Sometimes	Often	Always

26. Non-availability of adequate learning materials (notes/ books/internet search):

Never	Rarely	Sometimes	Often	Always

27. Becoming a Respiratory Therapist (Do expectations on all fronts put you under stress?):

Never	Rarely	Sometimes	Often	Always

28. Frequency of examinations:

Never	Rarely	Sometimes	Often	Always

29. Difficulty in reading the textbooks (For the presentation, scientific language, medical terminology, superficiality, etc.):

Never	Rarely	Sometimes	Often	Always

STRESSORS RELATED TO PSYCHOSOCIAL CONCERNS

30. Family problems (Health-related, lack of bonding, not supportive):

Never	Rarely	Sometimes	Often	Always

31. Lack of time for recreation:

Never	Rarely	Sometimes	Often	Always

32. Current housing conditions:

Never	Rarely	Sometimes	Often	Always

33. Loneliness:

Never	Rarely	Sometimes	Often	Always

34. Inability to socialize with peers:

Never	Rarely	Sometimes	Often	Always

35. Living away from home/family:

Not Applicable	Never	Rarely	Sometimes	Often	Always

36. Worrying about the future:

Never	Rarely	Sometimes	Often	Always

37. Relations with the opposite sex:

Not Applicable	Never	Rarely	Sometimes	Often	Always

38. Adjustment with the roommate/s:

Not Applicable	Never	Rarely	Sometimes	Often	Always

39. Lack of entertainment in your educational institution and the surrounding are:

Never	Rarely	Sometimes	Often	Always

40. High parental expectations (Do your parents want to see you with every success?):

Not Applicable	Never	Rarely	Sometimes	Often	Always

HEALTH-RELATED STRESSORS

41. Alcohol/drug abuse:

Not Applicable	Never	Rarely	Sometimes	Often	Always

42. Quality of food:

Never	Rarely	Sometimes	Often	Always

43. Illness affecting performances in class and examinations:

Never	Rarely	Sometimes	Often	Always

44. Sleeping difficulties (overstrain/disturbances in hostel/tension):

Never	Rarely	Sometimes	Often	Always

45. Physical disability or limitations (vision trouble/ migraines/ asthma/ other):

Never	Rarely	Sometimes	Often	Always

OTHER STRESSORS

46. Financial strain (Does the financial instability bother you?):

Never	Rarely	Sometimes	Often	Always

Thank you for your participation.

Appendix B: IRB Approval



INSTITUTIONAL REVIEW BOARD

Mail: P.O. Box 3999 In Person: 3rd Floor
Atlanta, Georgia 30302-3999 58 Edgewood
Phone: 404/413-3500 FWA: 00000129

August 02, 2023

Principal Investigator: Ralph Zimmerman

Key Personnel: Baogbah, Abdulmajeed A; Zimmerman, Ralph

Study Department: Respiratory Therapy

Study Title: Prevalence and Determinants of Perceived Stress Among Undergraduate Respiratory Therapy Students in Saudi Arabia (SA)

Submission Type: Exempt Protocol Category 2

IRB Number: H24045

Reference Number: 375803

Determination Date: 08/02/2023

Status Check Due By: 08/01/2026

The above-referenced study has been determined by the Institutional Review Board (IRB) to be exempt from federal regulations as defined in 45 CFR 46 and has evaluated for the following:

1. Determination that it falls within one or more of the eight exempt categories allowed by the institution; and
2. Determination that the research meets the organization's ethical standards

If there is a change to your study, you should notify the IRB through an Amendment Application before the change is implemented. The IRB will determine whether your research continues to qualify for exemption or if a new submission of an expedited or full board application is required.

A Status Check must be submitted three years from the determination date indicated above. When the study is complete, a Study Closure Form must be submitted to the IRB.

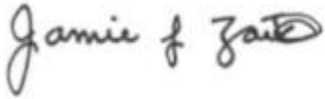
This determination applies only to research activities engaged in by the personnel listed on this document.

It is the Principal Investigator's responsibility to ensure that the IRB's requirements as detailed in the Institutional Review Board Policies and Procedures For Faculty, Staff, and Student Researchers (available

at gsu.edu/irb) are observed, and to ensure that relevant laws and regulations of any jurisdiction where the research takes place are observed in its conduct.

Any unanticipated problems resulting from this study must be reported immediately to the University Institutional Review Board. For more information, please visit our website at www.gsu.edu/irb.

Sincerely,

A handwritten signature in black ink that reads "Jamie f Zaikov". The signature is written in a cursive, somewhat informal style.

Jamie Zaikov, IRB Member

Appendix C: Cover Letter and Consent

Dear undergraduate Respiratory Therapy students,

We invite you to take part in a research study. This study aims to explore the prevalence and determinants of perceived stress among undergraduate Respiratory Therapy (RT) students.

This study is being conducted by Abdulmajeed Baogbah as a partial fulfillment of requirements for the master's degree in respiratory therapy from the Department of Respiratory Therapy at Georgia State University under the supervision of Dr. Ralph Chip Zimmerman, Assistant Professor.

This study does not offer direct benefits to participants. You will not have any more risk than you would have on a typical day. However, we hope to gain information about the prevalence and determinants of perceived stress to help enhance the educational journey for students.

If you decide to take part in this study, you will be required to complete the following survey, which should take no more than 15 minutes. Your participation is entirely voluntary, and you may refuse or withdraw at any time without consequences. If you do not wish to take part or if you withdraw, you will not lose any benefit that you are otherwise entitled to.

Please note that your responses are used exclusively and entirely confidential for research purposes. For your privacy protection, there will be no collection of personally identifiable information in this study. By completing and submitting the survey, you agree to take part in this study.

We look forward to the completion of your survey. However, you may withhold at any time by not completing or sending a blank survey if you decide not to participate in this study. The information from this study may be published in journals and presented at professional meetings. This study does not cost the participant in any way except for the time spent completing the survey.

If you have any questions, concerns, or complaints about the study, now or in the future, you can contact Abdulmajeed Abdulaziz Baogbah at abaogbah1@student.gsu.edu or Professor Ralph “Chip” Zimmerman at chip@gsu.edu. The department’s mailing address can be found at the bottom of this page. You may also contact the Georgia State University IRB at irb@gsu.edu. Your completion and submission of the survey imply that you agree to participate in this research. Please note that you may withdraw at any time by not completing or by clicking the disagree button.

Please note: If you agree to participate in this research, please continue with the survey.

Thank you in advance for your cooperation.

Sincerely yours,

Abdulmajeed Abdulaziz Baogbah

Department of Respiratory Therapy

Georgia State University

You can print a copy of this consent form for your record.