

ANTECEDENTS AND CONSEQUENCES OF ACADEMIC STRESS ON DIETARY HABITS OF UNIVERSITY STUDENTS: AN EXPLORATION OF STRESS COPING MECHANISMS AND HEALTH OUTCOMES

Qasim Ali Shah^{1*}, Adnan Wahab Qureshi², Zubair Shah³ and Manzoor Isran⁴

ABSTRACT

Students all around the globe experience increased stress when they enter a university after their secondary education. It has been observed that academic stress, much like other kinds of stress, has severe consequences for human health and other life activities. Taking into consideration the significance of the subject, this study aims to explore the factors causing academic stress among university students and its influence on their food consumption patterns along with other coping strategies employed by the students to manage their academic stress. The data was collected through three focus groups (22 participants). The critical, realistic approach followed by thematic analysis resulted in various themes i.e., types of stress; academic versus general, its antecedents, and impact; poor dietary habits, poor academic performance, and cognitive & behavioral problems. The findings also revealed various coping strategies, including pre-planning, prayer and meditation, reward systems, and attention diversion, employed by students to reduce their perceived academic stress. Interestingly, female students reported higher levels of perceived stress and resulting diet alterations than their male counterparts. The study also highlights various implications for university students, administrators, academic counselors, and future researchers.

Keywords: *Academic Stress; Food Consumption Patterns; Unhealthy Food; Young Students' Health and Behavior.*

INTRODUCTION

Joining a university often proves to be a stressful experience for students, particularly fresh college graduates (Dyson & Renk, 2006; Hossain et al., 2022). Students all around the globe experience increased stress when they enter a university after their secondary

¹ Lecturer, SZABIST University Larkana Campus, Larkana, Pakistan. Email: qasimali@lrk.szabist.edu.pk

² Medical Practitioner, SMBB Medical University, Larkana, Pakistan. Email: dradnan.wahab@gmail.com

³ Professor, Hamdard University, Karachi, Pakistan. Email: zubair.shah@hamdard.edu.pk

⁴ Professor, SZABIST University, Karachi, Pakistan. Email: isran@szabist.edu.pk

*Corresponding Author

education (Crombie et al., 2009). Stress is defined as the state of mental or emotional strain or tension resulting from adverse or demanding circumstances (Tariq et al., 2019). Research indicates that stress creates or aggravates infirmities ranging from substance abuse, suicide, mental illness, post-traumatic stress disorders, and domestic violence, to cardiovascular disease, respiratory problems, and other ailments (Sandifer & Walker, 2018). Poor psychological and physical health is often associated with stressful life situations (Örücü & Demir, 2009; Špiljak et al., 2022).

There can be several sources of stress that undergraduate students encounter throughout their university life. Some commonly recognized stressors include the social need to form friendships, adjustments required due to living away from home, being on one's own in a new environment, financial constraints, awareness of one's sexual identity and orientation, exposure to new people and taking some major life decisions (Örücü & Demir, 2009). Periods of academic stress experienced by undergraduate university students occur at predictable times during each college semester due to academic commitments, lack of time management skills, and financial limitations (Hossain et al., 2022; Misra et al., 2000).

Students are constantly under stress due to their studies and examinations. Academic stress stems from overwhelming academic course loads and evaluation procedures such as tests, quizzes, assignments (Yumba, 2010), examinations (Caso et al., 2020), and presentations (Misra et al., 2000). As the university semester progresses and exams approach, students feel increased expectations to achieve good grades, a fear of failure, and pressure to succeed and compete with peers (Al-Asadi, 2014; Ansari & Berg-Beckhoff, 2015). A glance at relevant academic literature suggests that academic stressors usually prove to be far more burdensome for most students than other stress sources, such as environmental or social stressors. Due to increased stress, students become more vulnerable and their diet deteriorates (Michels et al., 2020); their food choices vary (Choi, 2020) as they try to adjust before and during examination periods to obtain more free time to concentrate on their studies (AlJaber et al., 2019; Hossain et al., 2022).

Food plays a vital part in our lives, due to its undeniable influence on our health and well-being (Berhanu & Shiferaw, 2023; Vidal et al., 2018). Stress and eating have a complicated relationship, as different individuals' eating habits are impacted by stress in various ways (Greeno & Wing, 1994). Research indicates that academic stress positively correlates with self-regulation while eating, and altered dietary intake (Ling & Zahry,

2021). Surprisingly, food is not considered effective for students coping with academic stress, as eating does not reduce that stress (Robbins & Fray, 1980; Aafreen et al., 2020). Consumers already have a narrow-sighted approach towards food, focusing more on the immediate consequences of food consumption than on long-term benefits referred to as Food Myopia (Berhanu & Shiferaw, 2023). Moreover, psychological factors and personality traits are responsible for individual vulnerabilities and tendencies to adopt unhealthy eating as a coping mechanism for stress (Örücü & Demir, 2009; Gilbert et al., 2023).

Students often consider food consumption as a way to overcome their stress; however, food is not an ineffective way to cope with the stress, but still, students change their dietary patterns and shift their preference towards consuming higher quantities of sweet and fatty food items (Michels et al., 2020). For instance, preference for high-calorie sweet chocolate (M&Ms) over healthy sweet fruit (grapes) (Zellner, 2006) or consuming more quantity of snacks (crisps, chocolates, and biscuits) than usual during periods of stress, representing a clear shift in preference towards sweet and fatty food (Michels et al., 2020; Gilbert et al., 2023). The self-categorization of individuals as stress-eaters or under-eaters is another factor that can't be overlooked, as people who identify as stress under-eaters have the propensity to consume fewer calories in the form of carbohydrates and sugars than others who identify as being stress-eaters under conditions of academic stress (Emond et al., 2016).

Females generally display a greater inclination towards being more stressed in the face of academic hurdles during university as compared to their male counterparts (Herndon & Moore III, 2002). Eating behaviors of males and females vary significantly in response to stress (Mohamed et al., 2020). However, not many studies have developed an association between unhealthy food consumption and perceived stress among female university students (Wainer, 2010). This requires a better understanding of such behaviors.

While the relationship between academic stress and subsequent changes in dietary patterns has been covered extensively via academic literature, most studies originated from the United Kingdom, the United States of America, and the United Arab Emirates. Thus, the findings can't be accurately generalized for the Pakistani population considering the unignorable cross-cultural differences that mediate perceived stress (Slavin et al., 1991). Additionally, academic stress is increasingly becoming an alarming

mental health problem in Pakistan (Saeed et al., 2020), yet no research has sought to study its impact on changing dietary patterns. Nutrition-related diseases linked to dietary patterns such as cancer, coronary heart disease, stroke, and type 2 diabetes have been steadily on the rise in the recent past (Schulze et al., 2018). Building on this, the current study has threefold objectives. Firstly, to explore how university students (male vs. Female) describe academic stress and its causes. Secondly, how does academic stress influence the dietary behavior of Male vs. Female university students? Thirdly, what coping mechanism do university students follow to overcome academic stress, and does it differ based on gender?

MATERIALS AND METHODS

In this study, a critical realist theoretical approach has been used to explore how academic stress affects the food consumption patterns of students. The critical realistic approach helps researchers investigate complex and multi-layered research realities by emphasizing the real, actual, and empirical dimensions of a phenomenon (Scott, 2007). This approach helped authors move beyond mere descriptions to explain why and how things happen, facilitating deeper insights into causal relationships. Under this approach, we focused on both the individual views on academic stress and its influence on food consumption patterns and the ways that the broader social (i.e. through group discussion) and environmental context might influence those views (Braun & Clarke, 2006a; Fletcher, 2017; Scott, 2007).

The data was collected through a semi-structured Focus group approach to understand participants' opinions about academic stress and how it relates to food consumption patterns. The researchers started with an individual exercise to learn about the views of each participant regarding academic stress before a group discussion on the topic. This exercise helped the researchers explore and understand participants' opinions about the topic and encouraged corresponding interaction and debate between participants. It encouraged the participants to clarify their views on "How academic stress influences the individual's consumption patterns." Therefore, the focus group interviews were pretty useful due to their interactive nature of helping researchers understand how participants collectively conceptualized academic stress and how it influenced their food consumption patterns.

Participants

The participants were recruited using convenience sampling. Various university students were approached in person and via email to participate in the study. Later, an information sheet was sent to participants who were interested and eligible to participate. The criteria for inclusion were to be an undergraduate student of the selected universities with the age range of 18-23, as shown in Table I. A sample of 03 focus groups included 11 male and 11 female undergraduate students. The university students have different lifestyles and food consumption patterns compared to a general population (Morse & Driskell, 2009), and academic stress is ubiquitous among them; therefore, they were chosen for the study. To respect the privacy, names and other information of the student is undisclosed.

Table 1. Focus Group Participants' Information

Participants	Gender	Age	Field of Study	Degree Level	Year of Study
1	M	22	Business Administration	Undergraduate	3
2	M	21	Business Administration	Undergraduate	2
3	M	22	Business Administration	Undergraduate	2
4	M	22	Computer Sciences	Undergraduate	2
5	M	21	Computer Sciences	Undergraduate	1
6	M	21	Social Sciences	Undergraduate	1
7	M	22	Computer Sciences	Undergraduate	2
8	M	20	Computer Sciences	Undergraduate	1
9	M	21	Social Sciences	Undergraduate	2
10	M	23	Social Sciences	Undergraduate	2
11	M	19	Business Administration	Undergraduate	1
12	F	23	Social Sciences	Undergraduate	3
13	F	23	Computer Sciences	Undergraduate	3
14	F	22	Computer Sciences	Undergraduate	2
15	F	21	Social Sciences	Undergraduate	2
16	F	20	Social Sciences	Undergraduate	1
17	F	21	Computer Sciences	Undergraduate	2
18	F	22	Business Administration	Undergraduate	2
19	F	23	Business Administration	Undergraduate	3
20	F	20	Computer Sciences	Undergraduate	2
21	F	21	Social Sciences	Undergraduate	2
22	F	20	Social Sciences	Undergraduate	2

Procedure

In qualitative research, sample size can never be pre-determined (Morgan & Scannell, 1998); thus, the focus group was carried out till saturation of new insights was reached. Three focus groups (FG) were held over two weeks, one male, one female and one mixed group of both genders, using a semi-structured format. The focus groups were conducted in a controlled social setting, so the results could be easily compared, eventually

increasing the results' authenticity and reliability. Before the beginning of each focus group, participants were informed about the aim of the research and informed consent was signed by each participant. Each focus group was facilitated by a moderator and lasted between 50-60 minutes. The discussion was audiotaped with the consent of all the participants.

Data Analysis

All FGs were transcribed and reviewed for accuracy by the authors. After reviewing the data twice and getting familiarized with the data using an inductive approach, we analyzed data via thematic analysis. There were four steps – transcription of data, creation of codes, conversion of codes into concepts, and surfacing of primary themes related to the aim of the study (Braun & Clarke, 2006b, 2019; Clarke & Braun, 2017).

Researchers assigned the descriptive codes to the raw FG data, and the codes were converted into concepts based on the mutual consensus of authors. The findings are shown with selected codes and themes' descriptions, highlighting the key idea but not the data supporting a particular theme (Braun & Clarke, 2019). After all contents were categorized and sifted. The relationships we see between the themes and our broader interpretation of the findings are presented in the discussion, as shown in Table 2.

Table 2. Emerging Themes and Recurring Codes Via Thematic Analysis

Codes	Themes
Examination Stress, General Academic Stress	Academic Stress
Exams/study pressures, course overload, newness to university, making class groups, projects and assignments, presentations, hectic class schedules, tough exam schedules, fear of failure and dropouts, online learning	Causes of Academic Stress
Altered dietary habits, altered daily routines, mood, and behavioral changes, sleeping problems/nightmares, mental well-being, academic performance	Consequences of Academic Stress
Watching TV, pre-planning, social support, reward system, praying/meditating	Coping Strategies

RESULTS AND FINDINGS

Thematic analysis results in various themes which are discussed below.

Antecedents of Perceived Academic Stress and its causes:

All focus group participants related varying degrees of stress at various times during the semester. Common sources of high stress were examination periods, group projects, internship hunts, presentations, and many deadlines.

Students relate to two primary forms of academic stress: one during the examination period (i.e., exam stress), and the other centered on meeting project deadlines and group work (i.e., general academic stress). While exam stress was seen in both male and female participants, female participants related general academic stress to a greater extent.

One of the participants shared: *Like towards the end of the semester, you have multiple project deadlines, assignments, and the course load (male)*. However, some students also felt higher perceived stress at the beginning of the university semester.

I was more stressed towards the start. The first month of my university was very stressful for me because I needed to settle in, make the groups, and understand the psyche of my group members, which was the toughest thing. So, it is challenging at the beginning (female).

The participants reported lower levels of perceived stress when they believed they had managed their time well. Students who felt they had prepared sufficiently before the exam reported feeling little to no exam stress. Similarly, students who had allotted time to meet deadlines and stringently followed these timetables also reported lower perceived general academic stress.

One of the participants shared: *No [stress] before the exam because the exam is a circumstance, I can control individually.* “*[I feel most stressed] when I know, I have to study, but I cannot (male)*.”

Similarly, another participant stated that she felt less stress when she could choose her group members herself, as opposed to having pre-allotted groups. Thus, the degree of perceived control impacted the level of stress experienced by students. Students often compared their stress levels with their peers and shared that this helped relieve and “transfer” some of the perceived academic stress. Most female participants shared that they believed male students perceived lower stress than their female counterparts.

One of the respondents shared: *I think I do not know if it is just because we are women, but I think that we are always stressed. If we ask the boys, they say it is okay [if we fail], we will drop the course, and we'll take it again (female)*.

Students also reported lower levels of stress due to their university class schedule. Students related to feeling lower stress when they did not have an unmanageable schedule and had breaks between classes. On the other hand, back-to-back classes and exams were a cause of higher perceived stress in students, as shared by a participant:

[I experienced a lot of stress] when I had two exams in one day. I had to take an exam in the morning and then again study in the library for the second exam. When I know I am not doing enough, it is very stressful (Female).

Routine Changes

Participants related various deviations from their routines when experiencing academic stress. While multiple facets were impacted, the most common changes occurred in the type of food consumed, meal timings, sleep schedule, and mental well-being.

Some of the participants related changes in their dietary routine during periods of academic stress. *Meal-skipping* was a common phenomenon related to participants stating that they missed meals as they “forgot” to eat or deviated from their regular eating schedule. Some participants shared that while they were likely to skip meals when they eventually ate, they tended to eat more than their regular diet.

Consumption of junk food and caffeinated drinks was also common among participants as they relied more on caffeinated beverages and veered towards low-nutritional junk food. One of the participants shared: *My eating patterns change; I eat junk a lot when I am stressed. Sometimes I forget to eat and other times I do a lot of eating (female).*

Lack of sleep was another normal routine change as some participants also related some form of changes in sleep patterns. The most common cause was that they often stayed up late to study or meet deadlines, which was common between male and female participants. Participants also related decreased quality of sleep, while some of the participants also talked about experiencing exam-related nightmares. This was more common among female participants.

Many participants also related a change in overall mood due to academic stress. They described their attitudes to be more “irritated,” “short-tempered,” and “closed-off” than they generally were. While discussing the toll of stress on mental well-being, one female participant shared:

...your mental peace gets disturbed, and you are just not feeling relaxed at any time. Even if you are doing nothing, your mind is always working (female).

Other general routine changes related to the participants included *less time for socializing, altered prayer timings, and altered cell phone usage*. While participants generally defined the university as a place to meet and socialize with friends, students shared that they

decreased their social interactions with peers and family members during periods of high academic stress. While physical socializing has diminished, participants said they often spent more time on their phones and were likelier to “binge-watch” TV shows during periods of high academic stress.

Dietary Changes

Participants pointed out that due to the hectic schedules of classes, assignments, or upcoming exams, it becomes difficult for them to maintain regular timings of eating or even track whether they were consuming healthy or unhealthy foods.

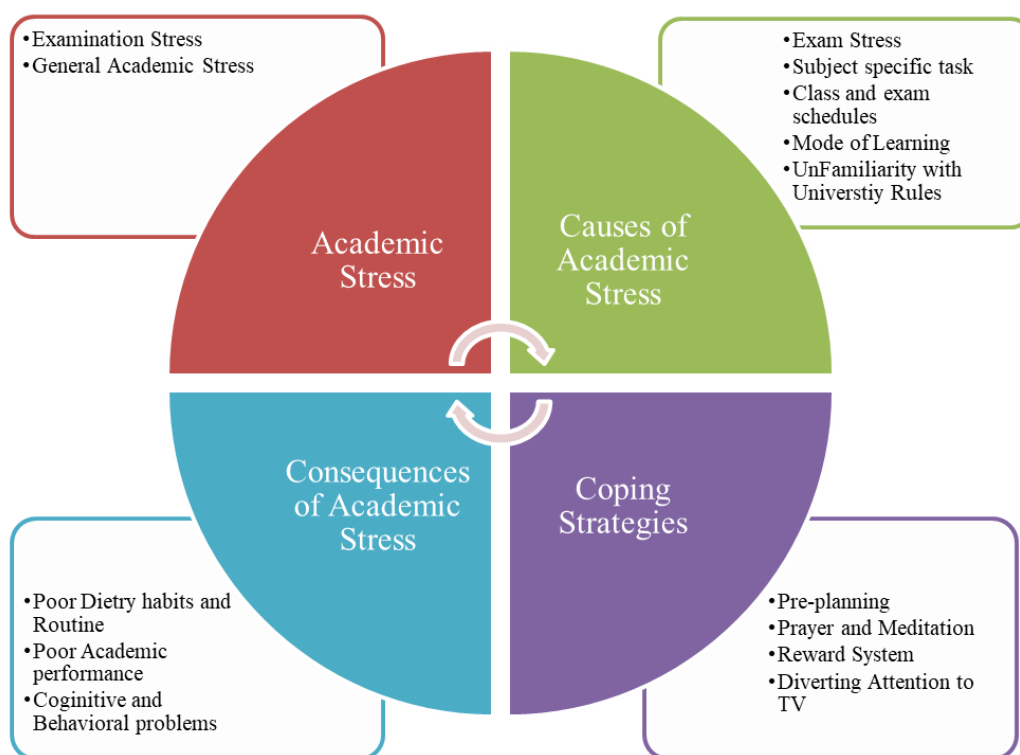


Figure 1. Conceptual Synthesis of Academic Stress Antecedents, its Consequences and Coping Strategies

Some participants highlighted in light of perceived academic stress that they would feel nauseated at the sight of food or be so occupied that they would unintentionally skip meals. Moreover, the intake of food items during high academic stress vs low academic stress varied to a great extent. Most participants leaned towards unhealthy food items (70%) to supplement their diets and help cope with the stress instead of eating healthy items. They explained this phenomenon by defining unhealthy food as ‘comfort food’ that helped them ‘feel good’ and relieve their stress. It was also found that intake of unhealthy

food relied greatly on the accessibility of the food items, since they were readily available and made more accessible for students. One participant quoted:

Usually, if I am staying up late at night and I don't have time to cook then I'm just going to go and eat popcorn or eat chips (female)

Interestingly, these dietary changes varied between male and female students. While males leaned towards overconsuming foods (67%) on average, in light of perceived academic stress, females were divided between over-consumption (57%) and reduced consumption (43%). Males consumed more unhealthy food than females and ate items such as “pizza, burgers, and fries” whereas females chose to skip meals and supplement their diets with sweeter items such as “ice- cream, chocolates, and brownies.

Other Stress Coping Strategies

The participants were also asked what other coping mechanisms they relied on besides food to help relieve the academic stress they felt. The findings indicated that students cope with academic stress mainly by watching TV shows or movies (31%), preparing timetables and planning for the future (22%), discussing their academic tensions with friends and families (18%) other mechanisms such as establishing a reward system for completing assigned goals (13.16%). Resorting to *watching a show or movie* to cope with stress was found to be the main avenue for relieving stress. Most of these participants were able to identify that watching movies and other TV shows help them avoid problems and help them cope with academic stress for some time. One participant mentioned:

I watch movies when I'm stressed, and I will not do anything when I am stressed. I will just lose myself in watching TV (male).

Another coping strategy identified from the responses was *planning*. It was one that students found to be the most effective and relatable as they thought that their thinking process had been initiated and that the first step had been taken. Formulating a schedule on how to manage the workload and complete the assigned tasks helped participants cope with the stress. One participant quoted:

My first instinct whenever I am stressed is to jot down my plan on a paper, a timetable for what I have to cover in that particular week; rather than a to-do list, and then I follow that” this helps me reduce the work stress (Female)

Further discussion revealed that some students relied on a sense of *spiritual connection and praying or meditating* as a coping strategy to relieve the stress felt. Regardless of which coping strategy students chose as their way of coping with stress, there was unanimous agreement that a social support system was essential in bearing stress, as a participant mentioned: *I think parents play a vital role if you're dealing with stress, and they're there for you (female).*

DISCUSSION

The findings can be classified into four elements: antecedents of perceived academic stress and its causes, dietary changes, routine changes, and coping strategies. The study results revealed that students experience different forms of academic stress at varying points of the semester, and the levels of this stress differ among male and female students. One important distinction of this study is the exploration of the distinction between examination stress and general academic stress. In contrast, the previous research has primarily focused on examination stress and its impact on various dimensions of a student's life (Lee, 1996; Shah & Patel, 2014).

The participants also discussed their perceived level of control as a factor that affected the level of stress they experienced. Their ability to manage their time, choose group members they believed were competent and prepare sufficiently before an exam impacted on the stress they felt during difficult academic times. Some possible causes could be an internal vs. the external locus of control (Abouserie, 1994), personality type (Arnten et al., 2008), or perceived importance of academics.

The study findings revealed that students tend to compare their perceived stress levels with their peers and doing so often reduces the level of academic stress they feel. Comparing yourself to other students could be a possible coping strategy, and past literature has not studied this relationship to the desired extent. Interestingly, female students experience higher academic stress than their male counterparts, following the findings of (Chacón-Cuberos et al., 2019; Rasheed et al., 2017). However, how this higher self-perceived stress impacts actual levels of stress experienced by students is worthy of further consideration.

Moreover, academic stress brings various changes in the student's life. Altered dietary patterns were more prevalent in females than male students, which is in accordance with (Mohamed et al., 2020) and (Al-Asadi, 2014). Female students reported a higher level of perceived stress than males, so the changes in their food consumption patterns are also

significant. Further studies can decipher whether dietary patterns correlate more strongly to general academic stress compared to examination stress.

The second most significant impact was seen in students' sleep schedules. The majority of the participants reported altered sleep schedules when experiencing high academic stress. Some female participants also reported decreased sleep quality and exam-related nightmares when undergoing high academic stress. This was not seen in male participants. (Wunsch et al., (2017) found that academic stress negatively impacts students' sleeping patterns, and more physical exercise and activities may reduce their impact on health. However, they did not focus on gender when experiencing more or less academic stress.

Most of the participants also related mood and behavioral changes as a result of high academic stress. Female students also reported feeling frustrated and impatient during these times. Zellner (2006), found that under stress, consumers move away from healthier food to more unhealthy food options, and compared to males, females report more food consumption as they feel better that way. These findings are more focused on general stress compared to academic stress. This also calls for future research to understand which stress (general vs academic) results in more food consumption and in what manner.

Moreover, university students' love affairs and academic stress influence their use of technology, resulting in smartphone addiction. Also, stress of self-career, family life, time management, and interpersonal relations impact their life satisfaction (Kuang-Tsan & Fu-Yuan, 2017). According to our findings, students use technology such as smartphones and binge-watching TV shows to cope with academic stress during their spare time compared to socializing with their friends and family. However, the excessive usage of smartphones may also result in increased technostress due to social interaction anxiety, need for touch, and locus of control (Lee et al., 2016).

The findings regarding dietary changes determined the extent to which a student's food consumption patterns would differ in the case of felt academic stress similarly, as they found that there was a clear lack of eating proper nutritional food at the onset of perceived academic stress (Cruz et al., 2013). Males, on average, were less likely to alter their diets due to academic stress than females, who not only changed their eating behaviors but did so in a manner that would harm their nutrition levels. These findings complemented the previous research that stress under-eaters and over-eaters were more likely to be women

than men (Emond et al., 2016) and females eating more 'sweeteners' under academic stress (El Ansari & Berg-Beckhoff, 2015).

The study's findings also highlighted some of the stress-coping strategies employed by students during academic stress. It was found that students relied on either avoidance, task-oriented, or emotion-oriented coping techniques to relieve their academic stress. Students focus on a mixture of these strategies, if not one, to manage their workload (Causey & Dubow, 1994). The avoidance-based coping strategy was watching TV shows and movies by students to relax and forget about the workload for some time. Participants also acknowledged that this was only a short-term strategy as they would eventually have to deal with higher stress levels due to wasted time. As for task-oriented strategies, the participants revealed that preparing and following a plan for managing the workload that often consisted of assignments or upcoming exams would deal with the situation by creating a realistic mind map on how to cover the course

Regarding emotion-oriented strategies, our study found that students with supportive family and friends felt that they could discuss and solve the problems that burdened them while being motivated to relieve their stress. These emotions were also regulated by how close they felt to their religion or the spiritual connection they felt gave them peace either by praying or meditating. These findings, in particular, were novel to what was found in the literature about the types of coping strategies students employ at the onset of academic stress.

STUDY IMPLICATIONS

The current study has highlighted some critical insights about how academic stress that undergraduate university students perceive might impact their eating habits. Poor or unhealthy food consumption patterns can eventually evolve into unhealthy lifestyles, nutrition-related diseases (Dhabhar, 2014; Kivimäki & Steptoe, 2018), and problems such as diarrhea and obesity. Hence, students must be made aware of the importance of time management, an essential skill (Kharadze et al., 2017; Khiat, 2022) that reduces the perceived stress they report. Being well-prepared and capable of solving academic challenges will reduce the academic stress that undergraduate students feel or go through. Furthermore, teachers must bear in mind the damaging potential outcomes of overburdening their students with excessive workloads, deadlines, and examinations (Stearé et al., 2023). Academia must ensure that they provide a reasonable amount of work to their students so that their growth and learning aren't halted and their mental

health isn't compromised (Zhou et al., 2021). Most importantly, universities should aim to provide flexible work schedules to students, as consecutive classes create work overloads and prove to be a significant source of academic stress for students with unfavorable timetables. Undergraduate students must be conscious of the coping strategies they resort to while dealing with academic stress (Nagle & Sharma, 2018). Effective and healthier coping strategies such as running, working out, taking regular breaks, staying hydrated, spending time with friends and family, or playing a sport (Kim & McKenzie, 2014) should be adopted to replace the unhealthy food consumption caused by academic stress.

STUDY LIMITATIONS

The qualitative studies have limitations as their findings provide the basis for the hypothesis development resulting in more representative and comprehensive quantitative studies. Firstly, the three focus groups were conducted from students from the three fields only. Considering that academic workloads and situations vary significantly depending on the programs students are enrolled in, the perceived academic stress and resulting food consumption patterns are likely to vary accordingly. Future researchers may expand the phenomena based on different fields of study. Secondly, our research focuses on understanding the behaviors of Pakistani students with a small sample size. However, there was a geographical constraint as all the information received throughout our research was from undergraduate students who resided in Karachi and were university students within the city. Moreover, a large and diversified sample with different socio-demographics might bring new insights and improve the generalizability of current findings.

CONCLUSION

The findings of this paper suggest that Academic Stress causes variations in the dietary patterns of Pakistani undergraduate university students. As per our results, the four major dimensions influencing this relationship are perceived stress and its causes, routine changes, altered food consumption patterns, and coping strategies. Our research also distinguishes between general academic stress & examination stress causing dietary and regular alterations. Moreover, the findings of this paper suggest that gender is an important variable influencing the relationship between the level of perceived academic stress and subsequent dietary changes in undergraduate students. Our results found that female students reported higher levels of perceived stress and resulting diet alterations

than their male counterparts. Finally, the major causes of academic stress were highlighted, and suggestions have been provided on how universities, teachers and students can make alterations to lower their perceived stress levels. These interventions may help prevent students from falling into unhealthy food consumption patterns and lifestyles that may be detrimental to their long-term health and fitness.

REFERENCES

- Abouserie, R. (1994). Sources and levels of stress in relation to locus of control and self-esteem in university students. *Educational Psychology, 14*(3), 323–330. <https://doi.org/10.1080/0144341940140306>
- Al-Asadi, J. N. (2014). Perceived stress and eating habits among medical students. *International Journal of Medicine and Pharmaceutical Sciences, 4*(3), 81–90.
- Al Rasheed, F., Naqvi, A. A., Ahmad, R., & Ahmad, N. (2017). Academic stress and prevalence of stress-related self-medication among undergraduate female students of health and non-health cluster colleges of a public sector university in Dammam, Saudi Arabia. *Journal of Pharmacy and Bioallied Sciences, 9*(4), 251-258. https://doi.org/10.4103/jpbs.JPBS_142_17
- AlJaber, M. I., Alwehaibi, A. I., Algaeed, H. A., Arafah, A. M., & Binsebayel, O. A. (2019). Effect of academic stressors on eating habits among medical students in Riyadh, Saudi Arabia. *Journal of Family Medicine and Primary Care, 8*(2), 390. https://doi.org/10.4103/jfmpe.jfmpe_278_18
- Arnten, A. A., Jansson, B., & Archer, T. (2008). Influence of affective personality type and gender upon coping behavior, mood, and stress. *Individual Differences Research, 6*(3), 139–168.
- Braun, V., & Clarke, V. (2006a). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101.
- Braun, V., & Clarke, V. (2006b). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health, 11*(4), 589–597. <https://doi.org/10.1080/2159676X.2019.1628806>
- Berhanu, K. Z., & Shiferaw, A. A. (2023). The mediating role of healthy lifestyle behavior in the relationship between religious practice and academic achievement in university students. *BMC Psychology, 11*(1), 416. <https://doi.org/10.1186/s40359-023-01292-4>

- Caso, D., Miriam, C., Rosa, F., & Mark, C. (2020). Unhealthy eating and academic stress: The moderating effect of eating style and BMI. *Health Psychology Open*, 7(2), 2055102920975274. <https://doi.org/10.1177/2055102920975274>
- Causey, D. L., & Dubow, E. E. (1994). Negotiating the transition to junior high school: The contributions of coping strategies and perceptions of the school environment. *Prevention in Human Services*, 10(2), 59–81. https://doi.org/10.1300/J293v10n02_04
- Chacón-Cuberos, R., Zurita-Ortega, F., Olmedo-Moreno, E. M., & Castro-Sánchez, M. (2019). Relationship between academic stress, physical activity, and diet in university students of education. *Behavioral Sciences*, 9(6), 59. <https://doi.org/10.3390/bs9060059>
- Choi, J. (2020). Impact of stress levels on eating behaviors among college students. *Nutrients*, 12(5), 1241. <https://doi.org/10.3390/nu12051241>
- Clarke, V., & Braun, V. (2017). Thematic analysis. *The Journal of Positive Psychology*, 12(3), 297–298. <https://doi.org/10.1080/17439760.2016.1262613>
- Crombie, A. P., Ilich, J. Z., Dutton, G. R., Panton, L. B., & Abood, D. A. (2009). The freshman weight gain phenomenon revisited. *Nutrition Reviews*, 67(2), 83–94. <https://doi.org/10.1111/j.1753-4887.2008.00143.x>
- Cruz, S. Y., Fabián, C., Pagán, I., Ríos, J. L., González, A. M., Betancourt, J., González, M. J., Rivera-Soto, W. T., & Palacios, C. (2013). Physical activity and its associations with sociodemographic characteristics, dietary patterns, and perceived academic stress in students attending college in Puerto Rico. *Puerto Rico Health Sciences Journal*, 32(1), 36-41.
- Dhabhar, F. S. (2014). Effects of stress on immune function: The good, the bad, and the beautiful. *Immunologic Research*, 58(2–3), 193–210. <https://doi.org/10.1007/s12026-014-8517-0>
- Dyson, R., & Renk, K. (2006). Freshmen adaptation to university life: Depressive symptoms, stress, and coping. *Journal of Clinical Psychology*, 62(10), 1231–1244. <https://doi.org/10.1002/jclp.20295>

- El Ansari, W., & Berg-Beckhoff, G. (2015). Nutritional correlations of perceived stress among university students in Egypt. *International Journal of Environmental Research and Public Health*, 12(11), 14164–14176. <https://doi.org/10.3390/ijerph121114164>
- Emond, M., Ten Eycke, K., Kosmerly, S., Robinson, A. L., Stillar, A., & Van Blyderveen, S. (2016). The effect of academic stress and attachment stress on stress-eaters and stress-undereaters. *Appetite*, 100, 210–215. <https://doi.org/10.1016/j.appet.2016.02.035>
- Fletcher, A. J. (2017). Applying critical realism in qualitative research: Methodology meets method. *International Journal of Social Research Methodology*, 20(2), 181–194. <https://doi.org/10.1080/13645579.2016.1144401>
- Greeno, C. G., & Wing, R. R. (1994). Stress-induced eating. *Psychological Bulletin*, 115(3), 444. <https://doi.org/10.1037/0033-2909.115.3.444>
- Gilbert, W., Bureau, J. S., Poellhuber, B., & Guay, F. (2023). Educational contexts that nurture students' psychological needs predict low distress and healthy lifestyles through facilitated self-control. *Current Psychology*, 42, 29661-29681. <https://doi.org/10.1007/s12144-023-04658-2>
- Herndon, M. K., & Moore III, J. L. (2002). African American factors for student success: Implications for families and counselors. *The Family Journal*, 10(3), 322–327. <https://doi.org/10.1177/1066480702103009>
- Hossain, Md. M., Alam, Md. A., & Masum, M. H. (2022). Prevalence of anxiety, depression, and stress among students of Jahangirnagar University in Bangladesh. *Health Science Reports*, 5(2), e559. <https://doi.org/10.1002/hsr2.559>
- Kharadze, N., Gulua, E., & Davit, D. (2017). Free-Time Management among Master's Degree Students of Georgia. *European Journal of Social Sciences Education and Research*, 11(2), 24. <https://doi.org/10.26417/ejsr.v11i2.p24-33>
- Khiat, H. (2022). Using automated time management enablers to improve self-regulated learning. *Active Learning in Higher Education*, 23(1), 3–15. <https://doi.org/10.1177/1469787419866304>
- Kim, J.-H., & McKenzie, L. A. (2014). The impacts of physical exercise on stress coping and well-being in university students in the context of leisure. *Health*, 6(19), 2570. <https://doi.org/10.4236/health.2014.619296>

- Kivimäki, M., & Steptoe, A. (2018). Effects of stress on the development and progression of cardiovascular disease. *Nature Reviews Cardiology*, 15(4), 215–229. <https://doi.org/10.1038/nrcardio.2017.189>
- Kuang-Tsan, C., & Fu-Yuan, H. (2017). Study on the relationship among university students' life stress, smart mobile phone addiction, and life satisfaction. *Journal of Adult Development*, 24(2), 109–118. <https://doi.org/10.1007/s10804-016-9246-y>
- Lee, M. (1996). Effectiveness of coping in adolescence: The case of Korean examination stress. *International Journal of Behavioral Development*, 19(4), 851–870. <https://doi.org/10.1080/016502596385060>
- Lee, Y.-K., Chang, C.-T., Cheng, Z.-H., & Lin, Y. (2016). Helpful-stressful cycle? Psychological links between types of mobile phone users and stress. *Behavior & Information Technology*, 35(1), 75–86. <https://doi.org/10.1080/0144929X.2015.1128972>
- Ling, J., & Zahry, N. R. (2021). Relationships among perceived stress, emotional eating, and dietary intake in college students: Eating self-regulation as a mediator. *Appetite*, 163, 105215. <https://doi.org/10.1016/j.appet.2021.105215>
- Michels, N., Man, T., Vinck, B., & Verbeyst, L. (2020). Dietary changes and psychosocial moderators during the university examination period. *European Journal of Nutrition*, 59(1), 273–286. <https://doi.org/10.1007/s00394-019-02110-y>
- Misra, R., McKean, M., West, S., & Russo, T. (2000). Academic stress of college students: Comparison of student and faculty perceptions. *College Student Journal*, 34(2).
- Mohamed, B. A., Mahfouz, M. S., & Badr, M. F. (2020). Food selection under stress among undergraduate students in Riyadh, Saudi Arabia. *Psychology Research and Behavior Management*, 13, 211. <https://doi.org/10.2147/PRBM.S237021>
- Morgan, D. L., & Scannell, A. U. (1998). Planning focus groups. *Planning Focus Groups*, 139–139.
- Morse, K. L., & Driskell, J. A. (2009). Observed sex differences in fast-food consumption and nutrition self-assessments and beliefs of college students. *Nutrition Research*, 29(3), 173–179. <https://doi.org/10.1016/j.nutres.2009.02.003>
- Nagle, Y. K., & Sharma, U. (2018). Academic stress and coping mechanism among students: An Indian perspective. *Journal of Child Adolescence Psychology*, 2(1), 6–8.

- Örücü, M. Ç., & Demir, A. (2009). Psychometric evaluation of perceived stress scale for Turkish university students. *Stress and Health: Journal of the International Society for the Investigation of Stress*, 25(1), 103–109. <https://doi.org/10.1002/smi.1218>
- Robbins, T. W., & Fray, P. J. (1980). Stress-induced eating: Fact, fiction, or misunderstanding? *Appetite*, 1(2), 103–133. [https://doi.org/10.1016/S0195-6663\(80\)80007-8](https://doi.org/10.1016/S0195-6663(80)80007-8)
- Saeed, M., Ullah, Z., & Ahmad, I. (2020). A Qualitative Exploratory Study of the Factors Causing Academic Stress in Undergraduate Students in Pakistan. *Liberal Arts and Social Sciences International Journal (LASSIJ)*, 4(1), 203–223. <https://doi.org/10.47264/idea.lassij/4.1.20>
- Sandifer, P. A., & Walker, A. H. (2018). Enhancing disaster resilience by reducing stress-associated health impacts. *Frontiers in Public Health*, 6, 373. <https://doi.org/10.3389/fpubh.2018.00373>
- Schulze, M. B., Martínez-González, M. A., Fung, T. T., Lichtenstein, A. H., & Forouhi, N. G. (2018). Food based dietary patterns and chronic disease prevention. *BMJ*, 361, k2396. <https://doi.org/10.1136/bmj.k2396>
- Shah, S. J., & Patel, H. M. (2014). Effect of examination stress on parameters of autonomic functions in medical students. *International Journal of Science and Research*, 3(7), 273–276.
- Slavin, L. A., Rainer, K. L., McCreary, M. L., & Gowda, K. K. (1991). Toward a multicultural model of the stress process. *Journal of Counseling & Development*, 70(1), 156–163. <https://doi.org/10.1002/j.1556-6676.1991.tb01583.x>
- Stearse, T., Muñoz, C. G., Sullivan, A., & Lewis, G. (2023). The association between academic pressure and adolescent mental health problems: A systematic review. *Journal of Affective Disorders*. <https://doi.org/10.1016/j.jad.2023.05.099>
- Scott, D. (2007). Resolving the quantitative–qualitative dilemma: a critical realist approach. *International Journal of Research & Method in Education*, 30(1), 3–17. <https://doi.org/10.1080/17437270701207694>
- Tariq, S., Tariq, S., & Tariq, S. (2019). Association of perceived stress with healthy and unhealthy food consumption among teenagers. *Journal of Pakistan Medical Association*, 69, 1817–1821. <https://doi.org/10.47391/JPMA.06-2019-0120>

Vidal, E. J., Alvarez, D., Martinez-Velarde, D., Vidal-Damas, L., Yuncar-Rojas, K. A., Julca-Malca, A., & Bernabe-Ortiz, A. (2018). Perceived stress and high fat intake: A study in a sample of undergraduate students. *PLoS One*, *13*(3), e0192827. <https://doi.org/10.1371/journal.pone.0192827>

Wainer, J. S. (2010). Perceived stress perceived social support, depression, and food consumption frequency in college students.

Wunsch, K., Kasten, N., & Fuchs, R. (2017). The effect of physical activity on sleep quality, well-being, and affect in academic stress periods. *Nature and Science of Sleep*, *9*, 117. <https://doi.org/10.2147/NSS.S132078>

Zellner, D. A., Loaiza, S., Gonzalez, Z., Pita, J., Morales, J., Pecora, D., & Wolf, A. (2006). Food selection changes under stress. *Physiology & behavior*, *87*(4), 789-793.

This is an open-access article
distributed under the Creative
Commons Attribution License 4.0

