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Research

The Association between Stress Factors and Number of Meals consumed per day in a sample of Pakistani Students

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Background

Studies have shown that stress not only affects the biological activities of the body but also the behavioral patterns. The purpose of this study was to discover Social Stress-Causing Factors among students in two Pakistani cities and their correlation with students' food intake.

Methods

347 students enlisted and responded to a questionnaire on the internet.

Results

The main causes of stress were finances, a lack of exercise, the pressure to achieve high marks, finishing courses and tests, exams, and meeting deadlines. 74.6% experienced a change in food intake (as measured by meal frequency) as a result of stress, with 56.2% reporting fewer meals. 35.2% of participants claimed to regularly make healthy food choices.

INTRODUCTION

Nowadays, the majority of individuals regularly endure stress, which permeates practically every facet of society. Due to the complexity of stress and the behavioral, endocrine, and neurological systems involved, understanding the impact of stress on health continues to be difficult (Finch, Tiongco-Hofschneider, and Tomiyama 2019). It is assumed to have an impact on health through two different but interconnected pathways: a direct biological road (for example, by affecting neuroendocrine and autonomic processes) and an indirect behavioral pathway (for example, by altering habitual and non-habitual health habits). These pathways probably work in a two-way manner, with changes in behavior influencing biology and biological changes influencing behavioral changes that have an impact on health (O'Connor and Conner 2011). Temporary stress can result in high blood pressure, migraines, stomachaches, insomnia, and chest pains. Additionally, stress has been shown to suppress the immune system, which increases colds and other illnesses during stressful periods. Chronic stress can also negatively affect both mental and physical health. It can lessen people's propensity to engage in healthy behaviors (such as maintaining a balanced diet, getting enough sleep, abstaining from tobacco use and excessive alcohol consumption, and cultivating supportive connections) (Britz and Pappas 2010).

The main stress-causing factors for college students have been the subject of much research. According to 'The 1999 Student Stress Survey', daily problems, rather than significant life events, are what cause students the most stress. It also discovered that adjustments to eating or sleeping schedules, higher workloads, vacations, and new responsibilities were some of the most common stressors (Ross, Niebling, and Heckert 1999). Youth frequently worry about academic stressors, with tests, homework, and grades being the main sources of anxiety listed by secondary school students (Australia 2014; Huan et al. 2008).

In the past 25 years, a significant amount of research has examined the connection between stress and eating behavior, and numerous studies have revealed that both adults and children who are under stress have changes in their food intake (Araiza and Lobel 2018; D. Hill et al. 2021; D. C. Hill et al. 2018). 35–40% of people consume more food when under stress (Oliver and Wardle 1999; Pool et al. 2015; Sproesser, Schupp, and Renner 2013). When stress is chronic, a person may eat more to cope with the stress, which can result in weight gain (Newman, O'Connor, and Conner 2007; Torres and Nowson 2007). In contrast, a person may eat less, resulting in weight loss (Ulrich-Lai et al. 2010).

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However, this issue has received very little attention in Pakistani students. Thus the goal of this study was to determine how stress affected a sample of students' appetites, as measured by the number of meals/day they indicated that they take on average on stressed and normal days. In addition, we looked into what made these students stressed out as well as documenting any alterations in meal frequency or how common it was for them to eat healthy foods.

METHODS

PARTICIPANTS

Links on social networking sites were used to recruit students from the educational institutes of the twin cities of Pakistan (Islamabad and Rawalpindi) for this cross-sectional survey. Among the 347 who volunteered to participate, 193 were females, and 154 were males. The educational level of the most of respondents was from matriculation to master.

MATERIALS

The survey questionnaire was designed by consulting published literature pointing out the factors responsible for stress. It included questions regarding demographics, stress-causing factors, meals per day during normal and stressful situations, changes in number of meals, eating behavior, and preferred food during stressful situations lifestyle. The questions were close-ended, with some options to choose from. After the approval from the CUST Ethical Review Committee, the links for the questionnaire were shared in various student social media groups which helped in recruiting students. The data were statistically analyzed using the Independent Sample T-Test and correlations functions of SPSS software.

RESULTS

Background of respondents 66.6% of the respondents were of higher secondary school level, 14.7% were of bachelor's level and 8.4% were at the master's level and the rest were at other levels (elementary, matriculation, etc.). The age range for the majority (66.6%) of the students was 16-19 years. Data were obtained from 42 educational institutes in Islamabad and Rawalpindi. 30.5% belonged to households with a monthly income of ⩽45000 PKR (⩽157.01 USD) whereas 34.9% of respondents had a monthly income of ⩽100,000 PKR (⩽348.90 USD). 64.8% had three or more siblings enrolled at various educational institutes.

Cumulative stress-causing factors Finances, concern about lack of physical activity, the pressure of scoring good grades, course completion and exams, health issues, and demeaning behavior of others were some of the major factors responsible for stress in students. (See Table 1.)

ASSOCIATION OF STRESS WITH FOOD INTAKE

The association of stress with general food intake level was also inquired from the respondents in the survey. Of 154 male respondents, 48% stated that they tend to eat less than usual when under stress, 13% more than usual, and 39% thought there was no effect of stress on their diet. Among female respondents, 62.7% stated that they eat less than usual, 22.8% eat more than usual, and 14.5% saw no change in the number of meals they stated they typically consumed per day. (See Figure 1.)

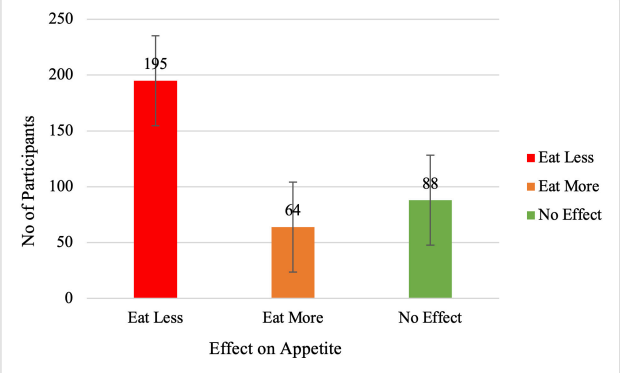

Figure 1. Students' estimates of the effect of stress on their appetite

The correlation (R value) between stress and its association with food intake for the entire sample was -0.824, implying that the overall impact was to reduce number of meals. The p-value was <0.001.

ASSOCIATION BETWEEN STRESS AND DAILY NUMBER OF MEALS

The respondents were asked about the number of daily meals they have on normal and on stressed days. Out of 154 male participants, on an unstressed day, 57.1% take three meals on average, 25.3% take two meals per day, 9.1% take one meal a day and only 5.8% take four or more meals per day. Four (2.6%) chose the 0 meal/day option. However, during the stressed period, 30.5% of male students marked that they eat two meals per day, 27.3% eat three meals, 20.1% take only a single meal, and 12.3% do not take any meal under such conditions. The percentage eating 3 meals/day reduced from 57.1% to 27.3% due to stress.

Out of 193 female respondents, 46.1% marked three meals/day during an unstressed period, 44.6% take two meals, 5.2% take one meal, and 4.1% take four or more meals daily. During stressed times, 32.6% of female students eat just one meal/day, 25.4% eat two meals, 22.3% eat three meals, 9.3% eat four or more meals and 10.4% (n=20) do not eat any meal in a day. The percentage taking 3 meals/day decreases from 46.1% to 22.3% on stress days.

Figure 2 presents the data on the association of stress days with the number of meals students marked that they take, combining the data of males and females. The R-value for the correlation between number of meals/day and stress was -0.284, a negative association. The p value was <0.001.

Table 1. Self-identified stress-causing factors, by sex of the student participants

Sr No.	Stress Causing Factors	Male (n=154)			Female (n=193)			Total (n=347)		
		Yes	*No*	*Maybe/ Sometimes*	*Yes*	*No*	*Maybe/ Sometimes*	*Yes*	*No*	*Maybe/ Sometimes*
1.	Financial Stress	20 (13%)	80 (51.9%)	54 (35.1%)	27 (14%)	96 (49.7%)	70 (36.3%)	47 (13.5%)	176 (50.7%)	124 (35.7%)
2.	Lack of Regular Exercise	53 (34.4%)	36 (23.4%)	65 (42.2%)	85 (44%)	25 (13%)	83 (43%)	138 (39.8%)	61 (17.6%)	148 (42.6%)
3.	Lack of Physical Activity	43 (27.9%)	79 (51.3%)	32 (20.8%)	83 (43%)	50 (25.9%)	60 (31.1%)	126 (36.3%)	129 (37.2%)	92 (26.5%)
4.	Pressure to Score High Grades	62 (40.3%)	50 (32.5%)	42 (27.3%)	67 (34.7%)	74 (38.3%)	52 (26.9%)	129 (37.2%)	124 (35.7%)	94 (27.1%)
5.	Competition to Secure High Grades	86 (55.8%)	68 (44%)	N/A	116 (60%)	77 (39.8%)	N/A	202 (58.2%)	145 (41.7%)	N/A
6.	Syllabus Completion & Preparation	67 (43.5%)	33 (21.4%)	54 (35.1%)	111 (57.5%)	17 (8.8%)	65 (33.7%)	178 (51.3%)	50 (14.4%)	119 (34.3%)
7.	Pressure to meet Deadlines	64 (41.6%)	48 (31.2%)	42 (27.3%)	83 (43%)	37 (19.2%)	73 (37.8%)	147 (42.4%)	85 (24.5%)	115 (33.1%)
8.	Examinations	80 (51.9%)	29 (18.8%)	45 (29.2%)	145 (75.1%)	8 (4.1%)	40 (20.7%)	225 (64.8%)	37 (10.7%)	85 (24.5%)
9.	Health-related issues	19 (12.3%)	125 (81.2%)	10 (6.5%)	45 (23.3%)	114 (59.1%)	34 (17.6%)	64 (18.4%)	239 (68.9%)	44 (12.6%)
10.	Health Issue of a Close One	51 (33.1%)	75 (48.7%)	28 (18.2%)	71 (36.8%)	73 (37.8%)	49 (25.4%)	122 (35.2%)	148 (42.6%)	77 (22.2%)
11.	Death of a Close One	49 (31.8%)	91 (59.1%)	14 (9.1%)	62 (32.1%)	115 (59.6%)	16 (8.3%)	111 (32.0%)	206 (59.4%)	30 (8.6%)
12.	Harsh/Insulting Behaviour or Taunts	21 (13.6%)	98 (63.6%)	35 (22.7%)	39 (20.2%)	83 (43%)	71 (36.8%)	60 (17.3%)	181 (52.2%)	106 (30.6%)

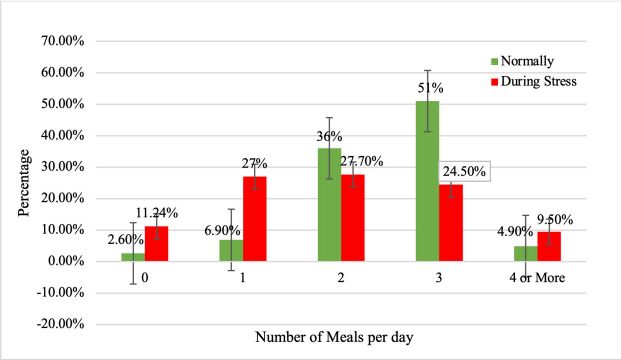

Figure 2. Stress and its association with the number of meals per day, male and female students combined

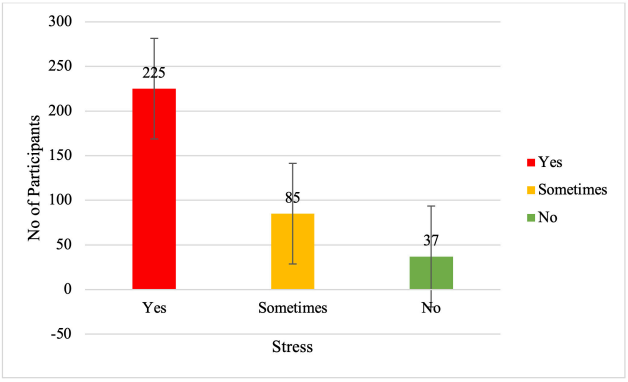

Figure 3. Exam stress, male and female participants combined

ASSOCIATION OF EXAM STRESS WITH NUMBER OF MEALS

51.9% (n=80) of males marked that they feel stressed before or during exams; 29.2% (n=45) marked sometimes and 18.8% (n=29) do not experience any stress related to or during exams. 75.1% (n=145) of females marked that they feel exam-related stress, 20.7% (n=40) sometimes and 4.1% (n=8) do not experience any such stress. (See Figure 3.) Exam stress had a positive correlation with the number of meals/day (R= 0.091, p=0.04).

ASSOCIATION OF EDUCATIONAL CURRICULUM WITH NUMBER OF MEALS

43.5% (n=67) of males marked that they feel burdened by long syllabi, 35.1% (n=54) marked "Little bit/Sometimes" and 21.4% (n=33) marked "No burden regarding syllabus completion and preparation". 57.5% (n=111) of females marked "Yes" when we asked if they feel the pressure of curriculum, 33.7% (n=65) sometimes, and 8.8% (n=17) feel no such pressure. (See Figure 4.)

The R-value was found to be 0.087 and the p value was <0.001.

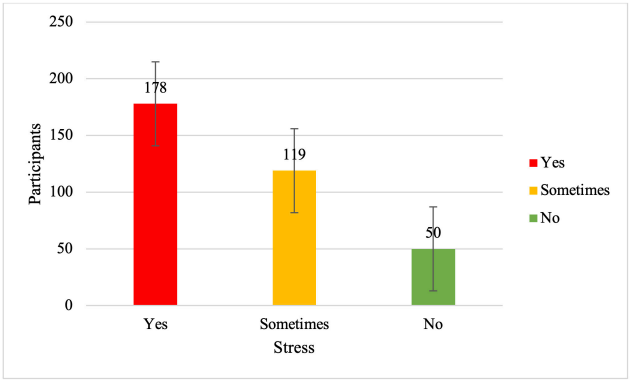

Figure 4. Stress felt from the curriculum, combined males and females

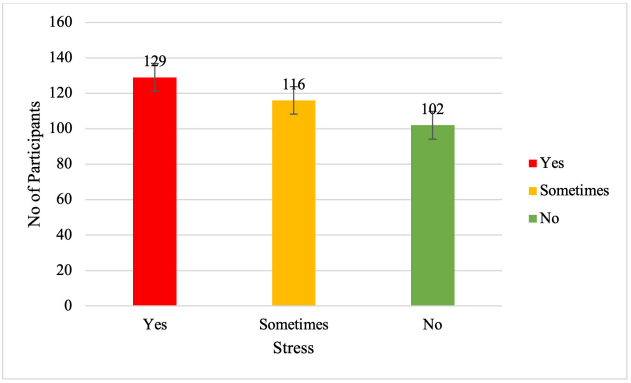

Figure 5. The Pressure of scoring high grades, combined males and females

THE PRESSURE OF SCORING WELL AND ITS ASSOCIATION WITH NUMBER OF MEALS

40.3% (n=62) of males marked that they face pressure to score high, 27.3% (n=42) sometimes, and 32.5% (n=50) said they were not under any family pressure to perform well on tests. 34.7% (n=67) of females felt the pressure to score high, 26.9% (n=52) sometimes and 38.3% (n=74) faced no such stress. (See Figure 5.)

The R-value correlation between the stress of scoring well and number of meals was -0.824 (p<0.001).

THE PRESSURE OF DEADLINES AND ASSOCIATION WITH NUMBER OF MEALS

41.6% (n=64) of male students marked "Yes" which means they feel stressed due to being given deadlines for task completion by the instructors, 27.3% (n=42) sometimes, and 31.2% (n=48) had no such stress. 43% (n=83) of female students indicated that they experience stress due to the deadlines, 37.8% (n=73) sometimes, and 19.2% (n=37) none. (See Figure 6.)

The correlation between the stress of meeting deadlines and its association with number of meals had an R-value of 0.006 (p=<0.001).

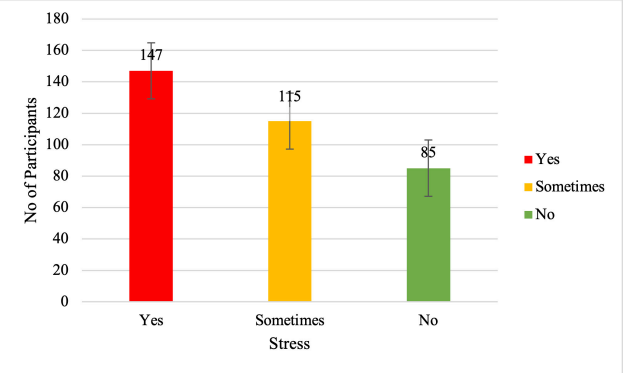

Figure 6. The stress of deadlines, males and females combined

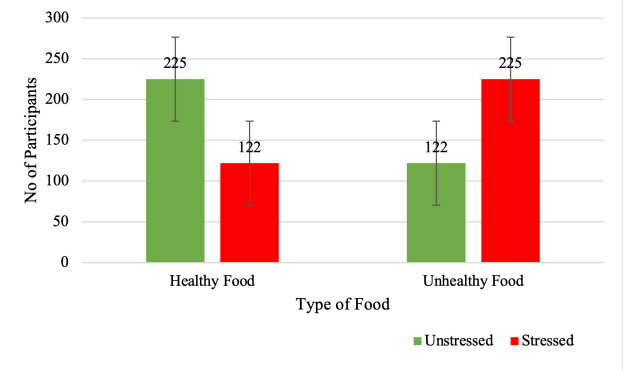

Figure 7. Stress and its association with the type of food consumed, males and females combined

ASSOCIATION OF STRESS WITH HEALTHY FOOD INTAKE

67.5% of males marked that they try to eat healthy foods in their daily routine, while 32.5% did not mind eating unhealthy food. 42.2% (n=65) said they try to eat healthy food even when stressed and the rest did not care about the quality of food they consume. 62.7% of female participants tried to eat healthy food daily and the rest did not. 29.5% (n=57) tried to eat healthy foods under stress and 70.5% (n=136) did not. (See Figure 7.) The R-value was found to be 0.212 with a p value of 0.264, and thus stress was not associated with type of food consumed.

DISCUSSION

Studies have shown that several psychological, social, and environmental factors could be responsible for causing stress among students (Britz and Pappas 2010; Wuthrich, Jagiello, and Azzi 2020). This is a crucial issue for educators because they are in charge of students' welfare, but also because research shows that academic performance might be hampered by stress (Putwain et al. 2015). In the present study, the prevalence of several stress-related factors and their association with stress among the high-school students of Islamabad and Rawalpindi.

11.5% of the participants felt they were forced by family and acquaintances in subject selection which is a crucial factor in building a negative attitude of students towards academics. In the society of Pakistan, youngsters are often forced to choose a specific subject or degree program regardless of their passion and personality.

A study conducted on behalf of the American Psychological Association in 2022 showed that 83% of adults blame inflation and money problem for the increased level of stress (Bethune 2022). Pakistan has an extremely high rate of inflation at 31.5% which greatly affects the population's mental health (Economics, n.d.). About half (49%) of the participants indicated that they face financial stress in their life. Students grow cognizant of the need to work harder and harder to get the desired goals when they observe difficult financial circumstances at home.

By their own estimation, lack of any physical activity or exercise was common in the lifestyle of our student participants. Students involved in some sort of physical activity have better academic performance due to enhanced cognitive skills (Marques et al. 2018).

Stress can have an impact on health not only directly on the biological system but also by changing diet and appetite (Nakamura et al. 2020). It has often been found to be linked to changes in both adult's and children's food intake (Araiza and Lobel 2018; Nakamura et al. 2020; O'Connor and Conner 2011). Meal frequency was chosen in the present study as the indicator of potential effects of stress on the diet. In Pakistani culture, three square meals per day with snacking in late morning and evening is widely practiced Many participants experienced deviations from taking two or three meals daily to one or no meal at all during stress. Similarly, the percentage having four meals per day while stressed also increased among the students which has also been documented previously (Oliver and Wardle 1999; Torres and Nowson 2007).

Exams in Pakistan might lead to advancement to the following grade, career, or other permanent employment. Exam success is celebrated, whereas exam failure carries a lifelong disgrace. Rejected candidates are denied any further opportunities and are stigmatized as social pariahs. The whole curriculum in Pakistani schools is focused on passing exams rather than evaluating knowledge (Khattak 2012). Examinations thus appear to be connected to elevated levels of stress in students (Chamberlain, Daly, and Spalding 2011; Putwain 2009). The present study too found many participants were experiencing stress due to exams. Similarly, the academic curriculum can also become a significant source of stress for students (Board 2019). Many of our participants were under stress due to the burden of the curriculum, as it is considered lengthy.

Time pressure has been found to have an impact on stress, decision-making, and motivation (Kuutila et al. 2020). Stress related to deadlines was common in our participating students.

In reaction to stress, some meals such as unhealthy high-fat foods, have been found to be more likely to be consumed and others, such as healthy low-fat and low-sugar foods, less likely to be consumed (D. Hill et al. 2021). In

the present study, students stated that they tried to have healthy foods but the percentage who said this decreased during stressed periods. A similar pattern was observed in a study of 2006, where 81% of students' appetites changed while they were under stress and only 33% of students reported eating healthy (Kandiah et al. 2006).

LIMITATIONS

This research was not done on a representative sample of students from the universities in these two cities and thus generations should be made with caution. As is true with all cross-sectional studies, it could not provide more than hypotheses about causation. Our findings are based on the assumption that students could recall and accurately report on stress that they tend to experience and its link with meal frequency. That is, we must assume that social desirability bias was not an important factor in how they replied to these questionnaires.

CONCLUSIONS

In conclusion, students experienced a great deal of stress throughout the academic year which could have significantly affected not just their health and academic performance, but also their appetite, as indicated by number of meals they stated that they consumed per day. Further research could reveal additional dimensions of the impact of stress on students' appetite, for example utilizing blood glucose or cortisol levels or by conducting an in-depth statistical analysis of each of the stress-causing factors individually as well as their relationships with each other.

DECLARATION OF COMPETING INTERESTS

The authors report there are no competing interests to declare.

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