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Effects of stress on eating behaviours in preadolescents

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Abstract
Stress is frequently recognized as the main cause of changed dietary habits. The purpose of this study is to determine how stress-related eating practices connect to stress.
Objective: To investigate the relationship between stress and eating patterns in pre-adolescents.
Methodology: Food and health habits of preadolescents aged 10 to 12 were studied in six schools across Kanpur.
Results: The study found that dietary habits do alter nutritional status. The statistically significant level was taken at $p > 0.05$. The study confirmed that childhood and adolescent diets had short- and long-term health effects. Adolescents should eat properly to improve both their mental and physical health. This study found a substantial relationship between pre-adolescent eating habits and fatty food preferences. Pre-adolescents who ate more fatty foods were shown to be more stressed, and this was at a 5% level of significance. In terms of reported stress, food intake, and healthy eating among pre-adolescents, girls were more stressed than boys. Preadolescents perceived stress was shown to be significant at 5%, but gender differences in sweets, cookies, and snack consumption were found to be significant at 5%.
Conclusion: The study proved that pre-adolescent diets had short- and long-term effects on health. To improve both their mental and physical health, adolescents should practise better dietary patterns.

Keywords: Stress, dietary pattern, dietary habits, food habits, nutritional status, preadolescents

Introduction
The term "stress" refers to the perception, evaluation, and response to harmful events or stimuli. Stress can be emotionally or physiologically difficult (e.g., interpersonal conflict, death of loved ones, unemployment) [1]. Also, regular and binge use of addictive substances might be pharmacological stress. Acute stress triggers adaptive responses, but persistent stress causes "wear-and-tear" (allostatic load) of the regulatory systems, weakening stress-related adaptive mechanisms and increasing disease vulnerability. Stress-related eating has been connected to an increased risk of obesity and distinct food and alcohol consumption among adults [2, 3]. Few studies are available on the interaction of stress with body weight or eating behaviour among paediatric and adolescent populations [4]. Pavithra *et al*. found that high school pupils' fat and energy intake were greater on exam day [5]. Adverse eating habits, such as eating high-energy-dense (fatty) foods, snacking, skipping breakfast, and eating less fruit and vegetables, seem to be more common among children and adolescents experiencing stress and those prone to emotional eating, or overeating in response to negative emotional arousal. Few lifestyle factors and health behaviours are linked to stress-induced eating and drinking in adolescence. Overweight, binge eating (eating a lot of food in a short period with a loss of control) and excessive weight-control behaviours typically co-occur among boys and girls. In obese people, binge eating is often accompanied by stress [6-8]. Preliminary evidence suggests dining with family may protect adolescent girls from disordered eating. Intrauterine circumstances may affect stress susceptibility and response to stress. Children of stressed mothers are more likely to have cognitive and emotional disorders, and premature delivery and small birth size reflect foetal exposure to maternal prenatal stress. Prenatal alcohol consumption also causes cognitive, neuropsychological, and behavioural issues [4].

Methodology
The study was conducted in Uttar Pradesh. This was done to show that the U.P. is a significant state. This study was conducted in Kanpur city district because the researcher is from there. This assisted the investigator in collecting accurate and timely data. In this study, schools were chosen because they had pre-adolescent students in the 6th, 7th, and 8th grades. This study

selected schools with the BSA officer of the Kanpur district. The chosen schools are co-educational. The researcher would choose six schools. 1. Swaraj India Public School 2. DPS school 3. V. Swaroop 4. J. K. Singhania, 5. Jaipuria 6. Sheiling House. This study enrolled 300 preadolescent children (150 boys and 150 girls). The duration of this study was two years [10].

Result and Discussion

Stress-induced eating can lead to weight gain and obesity (Torres & Nowson, 2007) [11]. Overeating is the major cause of weight gain and obesity. Stress-related metabolic alterations (Scott, Melhorn, & Sakai, 2012) [12] may also assist find out the correlation between stress and weight gain and obesity [12]. The present our study result and discussion in Table 1: Association between eating behaviour of respondents and variables and Table 2: Stress and eating habits of pre-adolescents.

Table 1: Association between eating behaviour of respondents and variables

Variables and level	Number	More fatty food		≥ 5 fruits and vegetables		More snacking		Breakfast every day	
		OR	P level	OR	P level	OR	P level	OR	P level
Gender									
Boys	150	1.00	0.00	1.00	0.16	1.00	0.00	1.00	0.00
Girls	150	0.61		1.03		0.86		0.64	
Weight									
Normal	110	1.00	0.00	1.00	0.19	1.00	0.00	1.00	0.00
Girls	190	0.77		1.02		0.68		0.74	
Stress									
Least	40	1.00		1.00		1.00		1.00	
Medium	83	1.46	0.00	0.81	0.00	0.86	0.41	0.80	0.31
High	177	1.81	0.00	0.76	0.02	0.98	0.02	0.72	0.00

(OR – Odd ratio, 0.00 – significant at 5.0 per cent level of significance)

Table 1 reveals the association between the eating behaviour of pre-adolescents and variable, boys and girls' respondents eating more fatty food, especially boys were liked fattier food exhibits significant effect. Boys demanded more snacking in comparison to girls were found to be significant at a 5.0 per cent level. Pre-adolescents eating breakfast daily show significant effects in the study area. Weight of pre-adolescents towards more fatty food shows significant at 5.0 per cent level, more snacking and everyday breakfast shows significant effect at 5.0 per cent level. The odds ratios for fatty food consumption increased gender-wise and weight wise. The high-stress group was more likely relatively unhealthy levels of snacking through such an increased breakfast every day. More fatty food consumed by pre-adolescents was found to be more stressful and in breakfast every day at a 5.0 per cent level of significance. Leigh *et al*. concluded that adolescent eating behaviour is a function of individual and environmental influences. Individual influences are psychological as well as biological, whereas, environmental influences include immediate social environments such as family, friends, and peer networks and other factors such as school meals and fast food outlets [13]. In addition, another important factor is the social system or macro-system which includes mass media, marketing and advertising, and social and cultural norms of the society. Adolescent girls in particular, because of their excessive concern with body weight or obsession with thinness, are reported with a moderate level of disordered eating behaviours. Disordered eating behaviours refer to many disturbed eating patterns which affect the nutritional status of adolescent girls. Adolescent girls are more prone to adopt various forms of eating behaviours than boys because they become preoccupied with and sensitive to their changing body size, shape, and physical appearance. Mallick, *et al*., study results showed that the weight loss plans among the study groups included exercise (21%), followed by meal skipping (20%), starvation (16%), binge eating (6%), and consumption of diet pills (2%), and the most commonly skipped meal was breakfast [14]. This growing concern has led many of them to adopt dietary modifications that potentially throw a serious threat to psychosocial development, nutritional status, and development of the eating disorder. Several factors like a family environment, peer pressure, media habits, concern over body image, socio-cultural and economic context, gender, and age make them feel dissatisfied with their body shape and weight. Obesity and eating disorders among adolescents are of serious public health concern owing to their high prevalence and adverse influence on psychological and physical health. The prevalence of overweight [body mass index (BMI) > 95th percentile for age and sex] based on the Centre for Disease Control and Prevention Growth charts among children and adolescents has increased steadily over the past three decades. Currently, 15 per cent of youth aged 6–19 years are found to be overweight. On the other hand, eating disorders like anorexia nervosa, bulimia nervosa, and binge eating affect a much small percentage of the adolescent population (1–3%) but are of great concern given their serious health consequences [6]. Another form of eating disorder called eating disorder not otherwise specified affects a much larger segment of the adolescent population, with prevalence estimates as high as 15 per cent. The eating habits of adolescents, in general, are in process of changing from a more traditional to a more westernized one. Eating behaviours like skipping meals, snacking, eating away from home, consumption of fast food, and following alternative dietary patterns are the common eating behaviours of Greek adolescents. This type of eating habit may lead to nutritional deficiency during adolescence which may have long term consequences such as delayed sexual maturation and lower final adult height [4]. In north India, about 0.4 per cent of college girls, residing in foothills regions of the Himalayas, practiced binge eating during festive occasions only to check overeating. These studies, none of the girls reported taking any diet pills, laxatives, or diuretics. Adolescent girls often opted for skipping of meals to control their body weight. The habit of snacking between main meals, girls who remained dissatisfied with their body weight were more inclined to diet. In India, weight concern and dissatisfaction over body weight were prevalent among underweight as well as overweight adolescent girls. Eating behaviours like skipping meals, eating

out, and snacking were common among these adolescent girls. Although girls had enough knowledge regarding nutritional deficiency, yet they did not/could not follow normal eating behaviours. As a result their diets remain deficient with energy, protein, iron, niacin, vitamin A, and fibre. The study further revealed that adolescent girls with unhealthy eating behaviours showed lack of interest in their educational assignment than girls with good eating habits. Nutritional disorders among another group of adolescent girls in India indicated that individuals of both high and low socioeconomic groups suffered from anaemia. A form of distress and disorder in eating habits and attitude towards the body weight had been reported among the adolescents in Chennai, the southern part of India. Later study by Srinivasan *et al*. showed that very few adolescents (11%) developed a milder Table 1 reveals the association between the eating behaviour of pre-adolescents and variable, boys and girls' respondents eating more fatty food, especially boys were liked fattier food exhibits significant effect. Boys demanded more snacking in comparison to girls were found to be significant at a 5.0 per cent level. Pre-adolescents eating breakfast daily show significant effects in the study area. Weight of pre-adolescents towards more fatty food shows significant at5.0 per cent level, more snacking and everyday breakfast shows significant effect at 5.0 per cent level. The odds ratios for fatty food consumption increased gender-wise and weight wise. The high-stress group was more likely relatively unhealthy levels of snacking through such an increased breakfast every day. 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Later study by Srinivasan *et al*. showed that very few adolescents (11%) developed a milder form of eating disorder with the fear of fatness. Augustine and Poojara reported that more than half of the adolescent girls residing in Ernakulam wanted to lose body weight. Results showed that the weight loss plans among the study groups included exercise (21%), followed by meal skipping (20%), starvation (16%), binge eating (6%), and consumption of diet pills (2%), and the most commonly skipped meal was breakfast. The result showed that more than 80 per cent of the girls wanted to become slim because they remain too much busy on thinking about their appearance, body weight, and shape. In this study most of the study participants showed high scores on anxiety, somatic symptoms, and social dysfunction subscales [15]. The author expressed that clinical symptoms of anorexia nervosa in India may be similar to those in western countries but the psychosocial development and psychodynamic aspects may be different in India. Freedman *et al*. concluded that respondents in the most stressed category were at greater risk of eating more fatty food and more snacks, but they were less likely to consume the recommended five or more fruit and vegetables or daily breakfast. Three outcome variables (fatty food, fruit and vegetables and breakfast) demonstrated what

may be considered dose-response relationships such that as stress increased, the likelihood of unhealthy dietary practice also increased. The magnitude of the different associations with eating behaviours for stress (i.e. most stressed vs. least stressed) was as strong, or stronger than, the differentials produced across the respective levels of all other variables considered. Collectively, these findings suggest that stress in associated with a shift toward a more unhealthy diet in respondents. Dietz (1994) has argued that adolescence is one of three critical periods for obesity (along with gestation/early infancy and the period of adiposity rebound occurring between 5 and 7 years). Obesity during these periods increases the likelihood of persistent obesity and its concomitant health risks (e.g., cardiovascular disease, Type 2 diabetes mellitus cancer, osteoarthritis, sleep apnoea [17]. A World Health Organization Consultation on Obesity (1997) warned that the current global pandemic of obesity could lead to millions of people around the world developing non-communicable disease and other health disorders. It also noted that childhood obesity was of particular concern. The present findings are consistent with the idea that stress-related influences on diet could contribute to the nutritional component of obesity.

Table 2: Stress and eating habits of pre-adolescents

Eating habits	Boys		Girls		Z	P – value
	Mean	SD	Mean	SD		
Perceived stress	8.21	2.72	9.20	3.02	3.611*	<0.05
Food intake pattern						
Fruit and raw & cooked vegetable	8.86	2.81	8.64	2.31	1.181	>0.05
Sweets, Cookies and snacks	7.93	2.88	8.81	2.60	2.753*	<0.05
Healthy eating						
Subjective of healthy eating	4.46	0.88	4.38	1.08	1.062	>0.05
Dietary guideline	3.03	1.29	3.08	1.31	1.117	<0.05

Table 2 depicts the perceived stress levels, food intake pattern and healthy eating of pre-adolescents, girls were as expected more stressed than boys. Only marginal gender differences were observed in fruit and vegetable consumption but girls ate more sweets, cookies and snacks than boys. No gender difference was present concerning healthy eating habits. Nearly all boys and girls agreed that healthy eating was important where the mean value was near>4, as for the healthy eating adherence boys and girls adhered to a mean near 3. Perceived stress of pre-adolescents was found to be significant at a 5.0 per cent level whereas sweets, cookies and snacks eaten gender wise were found to be means of difference at a 5.0 per cent level of significance. Subjective healthy eating and dietary guideline of pre-adolescents as per gender wise were found to be non-significant gender wise were found to be non-significant at a 5.0 per cent level of significance [4]. All the food groups were negatively associated with stress, showing that generally, perceived stress was associated with less food intake. These results were also confirmed by the two food intake pattern scores, but it was more pronounced and more stringent with the fruit, raw and cooked vegetables score than with the sweet, cookies and snacks score. The subjective importance of healthy eating was also negatively associated with increased perceived stress. There was no correlation between the computed healthy eating adherence index and perceived stress. In the current sample, girls were more stressed than boys [17]. Only marginal gender differences were apparent concerning fruit and vegetable consumption, but girls are more sweets, cookies and snacks than men. No gender difference was present concerning healthy eating habits In the Sjoberg *et al*. study, boys and girls consumed more snack food than major meals (26% vs 20% and 19%, P0.001). These groups had lower micronutrient intakes but greater sugar and alcohol intakes than breakfast eaters. Girls who skipped breakfast and lunch (8%) had a poorer nutritious diet and lower nutrient consumption. These females matured at 12.21.1 vs. 12.91.0 y (P0.001) in girls with regular consumed food intake [18]. Higher fruits and vegetable intake was associated with a lower perceived stress score.

Conclusion

Gender, SES, ethnicity, and weight were correlated with dietary behaviours. Gender and weight were predicted to moderate the stress-eating association, but this was not found. Stress did not affect the diet of any category of respondents. Stress appears to be consistently negative to children in terms of influencing their eating choices. Unusually, weight or gender has no significant interactions. Both have been extensively researched in the context of stress-eating connections. The present findings offer general support for the idea that specific dietary behaviours may be stress-related in respondents as young as 11 years old. Importantly, the data establish the habit cohort's baseline position for future comparisons. This association is expected to grow in size as the cohort ages and acquires control over their food habits. Stress reduces people's subjective evaluation of healthy eating, therefore people may be less likely to plan their meals wisely. However, adherence to nutritional requirements does not appear to be affected by perceived stress. It would be helpful to know more about the relationship between stress-related eating habits and nutritional recommendations in both girls and boys, as well as the type of stressor(s) and other dietary factors. Pre adolescents need to control their eating habits, including how much and what foods they eat.

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