

Psychometric Analysis of Eating Behaviors and BMI through TFEQ (Three Factor Eating Questionnaire) on Medical Students

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ABSTRACT

Objective: To assess effects of eating behaviors on BMI using the three-factor eating questionnaire on medical students.

Study Design: It was a quantitative analytical cross-sectional study.

Replace and Duration of Study: The study was carried out among medical students of Rawalpindi and Islamabad Pakistan, from Jan till Apr 22.

Methodology: A validated questionnaire (TFEQ) consisting of 51 questions was used to collect data online on 357 participants' cognitive restraint, disinhibition, and hunger. Sample size was calculated using WHO sample size calculator keeping 95% CI. The participants in the study were students from various medical universities of Rawalpindi and Islamabad Pakistan. We calculated BMI values from the demographics (age, sex, and weight), and divided participants into 4 groups.

Results: Rigid control and disinhibition both were positively related to BMI for the entire sample. There was a positive relationship between BMI and rigid control in females, while in male BMI was more positively related to disinhibition. Students characterized by both high disinhibition and high rigid control had significantly higher BMI than those by both low disinhibition and low rigid control. Hunger was also positively associated with BMI and effected both control and disinhibition ($p \leq 0.000$).

Conclusion: The results show that all three eating behaviors i.e., disinhibition, hunger, and cognitive restraint, affect the BMI scores of students. High levels of restraint lead to higher disinhibition, which leads to increased weight. Rigid control also results in increased hunger which causes bouts of relapse eating (increased disinhibition)–all leading to increased BMI.

Key words: BMI, Cognitive restraint, Disinhibition, Eating behaviors.

How to Cite This Article: Shahzad A, Mashhadi SF, Arif J, Latif AR, Rahman Z, Junaid A, Saleem H, Moez A. Psychometric Analysis of Eating Behaviors and BMI through TFEQ (Three Factor Eating Questionnaire) on Medical Students Pak Armed Forces Med J 2022; 72(Suppl-4): S811-815. DOI: <https://doi.org/10.51253/pafmj.v72iSUPPL-4.9662>

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INTRODUCTION

Obesity is a growing issue that can cause health and societal problems. A BMI of 30 or more is considered obese by the WHO. Additionally, there has been a sharp rise in the prevalence of being overweight, which is indicated by a BMI above 25. Between 1975 and 2016, the prevalence of obesity nearly tripled globally. Over 1.9 billion persons who were 18 years of age and older were overweight in 2016. Over 650 million of these adults were obese.¹ According to estimates from 2022, there are currently more over 1 billion overweight people, and that number is steadily rising. According to WHO predictions, 167 million adults & children will be overweight or obese by 2025.²

Being Since being overweight or obese is associated with more mortality than being underweight, middle- and low-income countries now bear a double burden of malnutrition. Increased BMI is a significant risk factor for several non-communicable illnesses, including diabetes, heart disease, musculoskeletal problems, and some malignancies.

BMI can be related to different eating behaviors. The 'Three-Factor Eating Questionnaire' is a widely used tool to assess eating behaviors. It measures three aspects of eating behaviors- cognitive restraint of eating, disinhibition, and hunger.^{3,4}

According to studies, eating habits can increase the quantity of energy consumed, which increases a person's risk of becoming obese.⁵ In certain research, cognitive constraint has been associated to greater weight gain in people of normal weight, however in other studies, it has been connected to decreased food cravings and a decreased risk of obesity.⁶⁻⁸

Hunger and emotional eating have both been linked to higher BMIs and obesity.⁹ It has also been suggested that emotional eating acts as a bridge between sadness and weight gain.¹⁰ Our study aims to study the effects of various eating behaviors on BMI of medical students as there has been no previous studies conducted in this setting using the Three Factor Eating questionnaire by Stunkard and Messick.³

METHODOLOGY

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This was a descriptive analytical cross-sectional study carried out to determine the effects of eating behaviors on BMI using TFEQ. The participants in the study were students from various medical universities of Rawalpindi and Islamabad Pakistan.

The ethical approval was taken from ethical committee, Army medical college, Rwp (ERC/ID/226).

Inclusion Criteria: Medical students of Rawalpindi Islamabad were included in this study.

Exclusion Criteria: non-medical students were excluded Ages ≥ 28 and ≤ 18 were excluded

Formed. Voluntary consent was taken from them before administering questionnaire.

A validated questionnaire (TFEQ) consisting of 51 questions was used to collect data through online google forms on 357 participants regarding cognitive restraint, disinhibition, and hunger. Sample size was calculated using WHO sample size calculator keeping 95% CI, 5% margin of error. It came out to be 357.

The instrument took an average of 10 minutes to complete. The scoring technique used was the same as mentioned in the original TFEQ. 1 mark was given on a specific answer, either true or false. As we have 3 different factors; cognitive restraint, disinhibition, and hunger, so we calculated individual scores of all the factors for each participant. After calculation of all factor scores, we divided the participants according to the BMI groups. We calculated BMI values from the demographics (age, sex, and weight). After this we divided participants into 4 groups according to WHO.

WHO BMI groups: Underweight < 18 , Normal weight 18.5-24.9, Overweight 25-29.9, Obese > 30 .

A questionnaire (TFEQ) consisting of 51 questions was used to collect data on participants' cognitive restraint, disinhibition, and hunger. The instrument took an average of 10 minutes to complete. The scoring technique used was the same as mentioned in the original TFEQ. There was 1 mark given on a specific answer, a true/false.

As we had 3 different factors cognitive restraint (conscious effort of restraining food intake), disinhibition (disinhibition of control) and hunger (feelings of hunger and its behavioral consequences) so we calculated individual scores of all the factors for each participant of our research. After calculation of all factor scores, we divided the Participants according to the BMI groups. We got the BMI values from the demographics (age, sex and weight).

RESULTS

Body weight in students of different sex group is associated with eating behaviors. The TFEQ can identify relevant eating behavior traits associated with higher BMI in this mixed-sex age group. The mean age of participants was 21.8 ± 1.41 years ranging from 18-25 years of age.

Out of 357 participants 163(45%) were Male and 199(55%) were female. Rigid control and disinhibition both were positively related to BMI for the entire sample. There were no gender differences in the TFEQ scores except that there was a positive relationship between BMI and rigid control in females, while in male BMI was more positively related to disinhibition.

Out of all the participants 70 were under weight, 227(62.7%) were of normal weight, 49 were overweight and only 16 were obese.

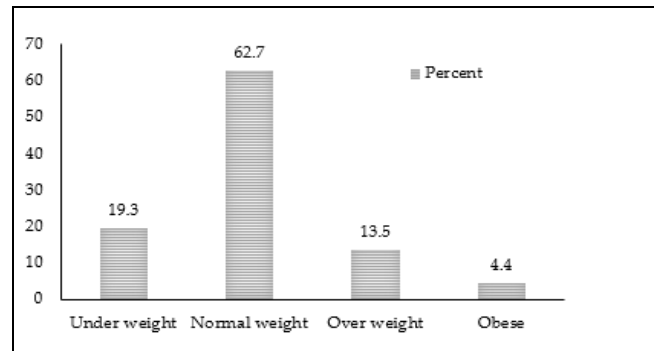


Figure-1: BMI in different age groups

In TFEQ, Factor 1 had 21 questions, Factor 2 had 16 questions and Factor 3 had 14 questions, each question had a specific score.

Factor 1: Cognitive restraint, was further divided into: Flexible restraint-Participants scoring 7-9 on restraint scale. Rigid restraint-Participants scoring 10 or above on restraint scale

Factor 2: Disinhibition, was divided into: Low disinhibition-Participants scoring 7 or less on Disinhibition scale. High disinhibition-Participants scoring above 7 on disinhibition scale.

Factor 3: Hunger: median score cut off value was 7.

Students characterized by both high disinhibition and rigid restraint had significantly higher BMI than those by both low disinhibition and flexible restraint. Both BMI and Disinhibition were positively related to hunger, the severity of the hunger is directly proportional to the severity of cognitive restraint shown by the Figure-2.

Since our data showed skewed distribution, we used median as a measure of central tendency. We found that in cognitive restraint median value gradually increased from normal weight to obese. The median values are 6, 9, 10 and 13 for underweight, normal overweight and obese students respectively.

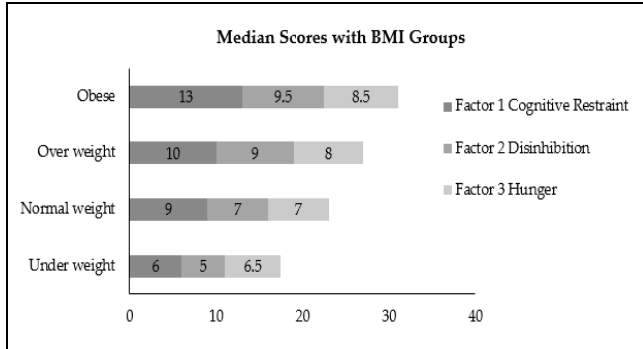


Figure-2: Median Score of BMI groups for their respective group

In addition to this, the median value for Disinhibition shows the same increasing trend. However, the values are less than the median values of Cognitive restraint. The value for underweight is 5 increased to 7 for normal weight. However, it increased to 9.5 for obese.

Furthermore, the median value for Hunger shows the upward trend. The value for underweight students is 6.50 and slightly increased to 7.00 for normal weight students. It increased to 8.00 for overweight and 8.50 for obese students. We found out that the higher the value of cognitive restraint in an individual, the higher the value of hunger.

This upward trend can be better appreciated in the chart below:

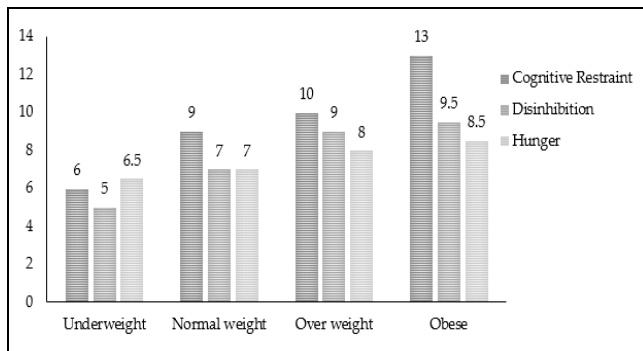


Figure-3: Median scores of every group for every factor

The median score for each of the three criteria across the four weight groups is shown in Figure-3.

The value of the cognitive constraint score rises as we move from being underweight to being obese. However, why does the group with the higher restraint score have a higher BMI? The third element, hunger, is key.

The groups who performed better on the restraint scale also performed better on the hunger scale, whereas the groups that performed worse on the restraint scale also performed worse on the hunger scale.

The groups that scored higher on disinhibition also scored higher on hunger. Simply put, the groups that restrained themselves more frequently, strictly followed a routine of restriction, were hungrier. As a result, they consumed more calories than they had expended through rigid restraint, which led to an increase in BMI.

BMI decreased in the groups that had adhered to a flexible restraint schedule, felt less hungry, and experienced fewer disinhibition relapses.

When we compared the three eating behaviors to see the difference between groups (ANOVA) and their effects on BMI, Cognitive restraint and disinhibition were statistically significantly associated with BMI, ($p < 0.000$)

DISCUSSION

The goal of the current study was to examine the relationship between BMI and various eating habits, such as hunger, disinhibition, and cognitive constraint, in a group of medical students of both sexes. We examined these behaviors using the Stunkard and Messick Three Factor Eating Questionnaire-51, computed individual scores for the three factors, and linked the results with BMI. According to the WHO classification, our population was split into four groups based on BMI: underweight, normal weight, overweight, and obese. All three characteristics had a favorable correlation with BMI, according to the findings.

According to our findings, disinhibition, which is the propensity to overeat in reaction to unfavorable emotional situations or the presence of very appetizing foods, is strongly related to body weight.¹¹⁻¹⁴ This indicates that pupils with increasing body weight are more likely to eat under pressure than are students in lower weight categories. BMI and cognitive constraint have varying relationships; some researchers have found an indirect connection,^{5,16} others show no association,^{17,18} and still others show a direct associa-

tion.¹⁹⁻²² In line with what our study's findings showed, pupils who experienced more restraint (also known as stiff control) had higher body weights, while those who experienced less restraint (also known as flexible control) had somewhat lower body weights. In our findings, there was a linear link between hunger and BMI.²³ Results for hunger were in line with earlier studies that indicate a favorable correlation.^{17,24}

Individuals with high disinhibition and high restraint had higher BMI ratings, which is consistent with earlier studies. Analysis also revealed a relationship between disinhibition and constraint.^{11,13} These findings imply that high levels of constraint induce disinhibition, which raises the risk of weight gain. In contrast to the low-restraint, high-disinhibition group, which had increased weight, the low-restraint, low-disinhibition group had decreased body weight, according to other studies.^{17,25} Also present as a parameter is rigid and flexible control of restraint. Studies indicate that high disinhibition with rigid control of restraint is a greater risk for obesity as compared to flexible control and disinhibition.¹³

The relationship between hunger and body weight was also clear.¹⁷ According to our findings, rigorous control increased hunger, which in turn increased disinhibition, which ultimately led to a rise in BMI. This link held true independently. Flexible control-involved behaviors resulted in less disinhibition, which reduced hunger and eventually led to relapse eating, resulting in lower body weight and BMI.

Individuals with lower scores in all three criteria had lower body weights, while those with higher scores had higher BMIs, according to analysis of the combined features of the three components.

Both self-control and eating in response to unpleasant emotions were found to be directly correlated with increased body weight. Disinhibition and constraint are also linked; excessive restraint raises disinhibition levels, which are linked to an increase in body weight. According to our findings, hunger and BMI are directly correlated; greater constraint causes increased hunger, which finally results in weight gain and a higher BMI.

LIMITATIONS OF STUDY

Our study is not without limitations. Age and gender were not considered as a variable for comparison. Data collected was self-reported so was liable to bias. The population chosen was medical students, so generalizability

is also a limitation. Time constraints, financial resources and literature access were also hinderances. Finally, our study design was cross sectional, so a cause-and-effect relationship cannot be established.

RECOMMENDATIONS

Our research has demonstrated that both disinhibition and restraint have a pivotal role in obesity and eating disorders. The impact of high restraint leads to increased BMI and disordered eating, whereas the impact Restraint is dual, varying with flexible and rigid control. This complex behavior suggests that interventions should be targeted to decrease disinhibition rather than to increase restraint. Specific targeting that reduces disinhibition and regulates restraint (I.e., improves flexible restraint and decreases rigid restraint) warrant success.

The TFEQ was able to identify relevant eating behavior traits associated with higher BMI in this mixed-sex age group. Disinhibition and rigid control should be targeted in students to characterize youth at risk for obesity, and to implement proper weight control strategies or to predict success or failure in weight-loss participants.

CONCLUSION

Our results show a direct association between all three eating behaviors and BMI. Cognitive restraint, disinhibition and hunger all effect BMI, independently and in relation with each other. High levels of restraint lead to higher disinhibition, which leads to increased weight. Rigid control also results in increased hunger which causes bouts of relapse eating (increased disinhibition) - all leading to increased BMI.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

AS: Supervision, conception, design, revising & final approval of the version to be published.

SFM: Co-Supervision, Drafting of Article, Data analysis, Revising & final approval of the version to be published.

JA: Conception, Design, Intellectual Content & final approval of the version to be published.

ARL: Conception, Design, Intellectual Content & final approval of the version to be published.

ZR: Acquisition of data, Interpretation, Revising & final approval of the version to be published.

AJ: Drafting of article, Intellectual content & final approval of the version to be published.

HS: Revising, Analysis, Conception design Intellectual content & final approval of the version to be published.

AM: Conception design, Drafting of article, Acquisition of data & final approval of the version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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