Relationship of cognitive restriction, emotional and external eating with weight pattern in adolescent students 15-18 years: analytical study of Guelma high schools

علاقة التقييد المعرفي والأكل العاطفي والخارجي بنمط الوزن عند التلاميذ المراهقين 15- 18 سنة: دراسة تحليلية بثانويات ولاية قالمة

Relation entre la restriction cognitive, l'alimentation émotionnelle et externe avec le schéma de poids chez les adolescents de 15 à 18 ans: étude analytique des lycées de Guel

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ملخص

تهدف هذه الدراسة إلى معرفة تغيرات وزن جسم التلاميذ المتمدرسين (15—18 سنة) بثانويات ولاية قالمة بناء على مؤشر الكتلة الجسمية وبحسب معايير IOTF وعلاقتها باضطرابات السلوكات الغذائية (التقييد المعرفي، الأكل العاطفي والأكل الخارجي) باستخدام استبيان الأكل الهولندي (Van 1986 Strien et al ,). و اعتمد الباحث على المنهج الوصفي التحليلي على عينة ضمت 960 تلميذا، كما اعتمد في الاستدلال على النتائج على معامل الارتباط، على اختبار الانحدار الخطي المتعدد وتحليل التباين لتفسير العلاقة.

أظهرت النتائج أن 17.81% تلميذا من أصحاب الوزن الزائد لديهم تقييد معرفي اتجاه الأكل متجاوزين الحاجة الفسيولوجية للطعام، و 15.62% من نفس فئة الوزن يظهرون أكلا عاطفيا و11.04% من نفس الفئة لديهم الأكل الخارجي استجابة للإشارات الخارجية متجاوزين في ذلك الحاجة البيولوجية. كما أظهرت النتائج أن التقييد المعرفي لا يرتبط ارتباطًا وثيقًا بالوزن الزائد (بما في ذلك السمنة) (0.05 <Sig) ، الدرجات لا تزيد مع مؤشر كتلة الجسم؛ الأكل العاطفي والأكل الخارجي مرتبطان ارتباطًا وثيقًا بزيادة الوزن (بما في ذلك السمنة) (0.05 < Sig) ، ويرتبط اضطراب سلوك الأكل هذا ارتباطًا إيجابيًا مع مؤشر كتلة الجسم (0.05< Sig)

الكلمات الدالة: اضطرابات السلوكات الغذائية؛ مؤشر الكتلة الجسمية؛ السمنة؛ زيادة الوزن.

Abstract

This study aimed to search on the relationship between eating disorders and body mass index (Overweight, obesity) in adolescent high school students in Guelma. The study was conducted in a group consisting of 960 students (15-18 years). The

TCA was evaluated by the test of the "Dutch Eating Behavior Questionnaire" of Stunkard and Messick (DEBQ), Anthropometric parameter (body mass index). Results and statistical analysis revealed that Cognitive restriction is not significantly correlated with overweight (obesity included) (Sig>0.05), and scores do not increase with BMI; besides, Emotional eating and External eating were significantly correlated with overweight (obesity included) (Sig<0.05).These Eating Behaviour Disorder are positively correlated with BMI (Sig<0.05). The results confirmed that the emotional eating of the pupils was due to negative feelings (anxiety, tension, depression, feeling lonely); it also responds to external signals (appearance and smell of food) bypassing biological need.

Keywords: eating disorders; body mass index; overweight; obesity**.**

Résumé

Cette étude vise à connaître les variations de poids corporel des élèves (15-18 ans) des lycées de la Wilaya de Guelma en fonction de l'indice de masse corporelle et leur relation avec les troubles de l'alimentation (restriction cognitive, alimentation émotionnelle et alimentation externe) selon les normes IOTF en utilisant le Dutch Eating Questionnaire (1986 Van Strien et al,). la méthode employée est descriptive - analytique sur un échantillon de 960 étudiants. Les résultats ont montré que 17,81% des élèves en surpoids ont une restriction cognitive à l'égard de l'alimentation, 15,62% du même groupe de poids expriment une préférence pour une alimentation émotionnelle et 11,04% du même groupe ont une alimentation externe en réponse à des signaux externes contournant le besoin biologique. Les résultats ont également montré que la restriction cognitive n'était pas étroitement liée au surpoids (y compris l'obésité) (Sig>0,05), les scores n'augmentaient pas avec l'IMC. L'alimentation émotionnelle et l'alimentation externe sont étroitement liées à la prise de poids (y compris l'obésité) (Sig<0,05), et ce trouble du comportement alimentaire était positivement corrélé à l'IMC (Sig<0,05).

Mots clés: trouble de l'alimentation; Indice de masse corporelle; Obésité; prise de poids.

Introduction

The human being takes food in response to the biological needs of the body, to perform its vital functions and daily activities efficiently. Food affects human health in quantitative and qualitative terms as it is related to everything that enters the body from food and liquids through the mouth until they are excreted from the body. Nutrition varies in different societies and individuals as there are many factors that affect a person's nutrition or need for food, such as psychological factors, nutritional

behaviors, economic level, and method of providing food…Any defect in these factors can cause various disorders,   especially those affecting the nutritional behaviors of the individual. It can also become a factor causing the change in body weight with increase.

The World Health Organization (WHO) indicated that there are terrifying numbers about obesity and overweight. The worldwide prevalence of obesity nearly tripled between 1975 and 2016.In 2016, more than 1.9 billion adults aged 18 years and older were overweight. Of these over 650 million adults were obese. The report showed that 39% of adults aged 18 years and over (39% of men and 40% of women) were overweight and 13% of the world's adult population (11% of men and 15% of women) were obese. Over 340 million children and adolescents aged 5-19 were overweight or obese in 2016.The prevalence of overweight and obesity among children and adolescents aged 5-19 has risen dramatically from just 4% in 1975 to just over 18% in 2016. The rise has occurred similarly among both boys and girls: in 2016, 18% of girls and 19% of boys were overweight.(WHO, 2020)

Eating behavior disorder refers to an abnormal change in behaviors towards eating to become different from the usual behaviors that can have negative consequences on a person's physical and mental health. The primary manifestations of these disorders were what was termed anorexia (l'anorexie) and bulimia (la boulimie), the two oldest eating behavior disorders in humans, the latest edition of the DSM-V refers to the EBD review and classification.(American Psychiatric Association, 2013)

The eating behavior is associated with human instincts (hunger, which is a signal indicating the body's need for food) and the daily habits of the individual and the search for nutritional pleasure in response to a psychological or socio-cultural condition.(Sahuc, 2006)

A motive conflict between psychological cognitive choices and physiological requirements in adolescent students, which appears in eating various foods without taking into account energy density body weight, eating meals between main meals and in the evening or late at night, can be a cognitive factor in increasing the weight of the student. Also, the confusion between the emotional need and the nutritional need, which appears in the negative feelings within the student, such as tension, discomfort, depression, anxiety, and loneliness show an emotional factor.

As for the absence of internal biological sensations (hunger and satiety) and eating under the influence of an external signal resulting from the food that seems appetizing to the student from his appearance or smell, or in the company of a person eating a meal, all of them express the dimension of eating in response to external indicators.

The change in the weight of the adolescent student in excess of the normal weight means that there is an imbalance in one or more of the factors that express the lifestyle. The eating disorder can be among the factors that contribute significantly to the prevalence of overweight and obesity in the study population; accordingly, the researcher raises the following question:

- Is there a statistically significant relationship between the body mass index (obesity, overweight) and eating behavior disorders among secondary school students in Guelma (15-18 years)?

- The researcher assumes that there is a statistically significant relationship between eating disorders using the Dutch Eating Questionnaire with its three factors (cognitive restriction, emotional eating and external eating) and the body mass index (normal weight, overweight and obesity) in adolescent students (15-18 years).

1. Theoretical part
1.1 Research concepts and terms

1.1.1 Obesity: Obesity in children and adolescents is defined as a medical condition represented by being overweight and an increase in the amount of fat tissue, distributed over the fat storage areas in the body.(Benony & all, 2008)

1.1.2 Overweight: According to the World Organization of Health, Overweight is defined as abnormal fat accumulation and a BMI greater than or equal to 25 that may impair health.(WHO, 2020)

1.1.3 Disorder: The term disorder in language expresses the state of instability, disturbed matter meaning disorder.

1.1.4 Eating behavior: It is defined as the way that a person or society consumes food during the day. Eating behavior is influenced by the type and availability of food (local production or import),social customs, traditions, economic condition, climate, and health status.

1.1.5 Age group (15-18 years): It is the middle stage of adolescence, confined between 15 and18 years. The teenager at this stage

increases strength and ability to control physical movements, and intelligence reaches its maximum at 16 years. The processes of comprehension and perception increase; it also shows tendencies, abilities and aptitudes, and begins to form principles and trends about life and society.(اسماعيل,1982)

1.2 Previous studies

1.2.1 The first study: Romina Antinori(2004)

- **Study title:** Psychological evaluation of eating behavior during dietary therapy for obesity - A thesis for obtaining a doctorate degree in Medicine, Faculty of Medicine, NANCY1 University.
- **Aim of the study:** This study aims to observe how the obese patient develops according to the psychometric characteristics of his nutritional behavior, in particular the developments of his weight curve during dietary management.
- **Method:** the researcher used the analytical method. The researcher used Dietary Behavior Disorder Questionnaires (DEBQ, TFEQ) and anthropometric measurements.
- **Sample:** The researcher relied on a sample of 145 people.

Results:

- People most resistant to weight loss are characterized by cognitive restriction, emotional eating, and eating outside of time.
- A higher rate of cognitive restriction leads to improved weight loss.
- The researcher concluded that cognitive restriction is the most important factor affecting weight loss, and then emotional eating comes with a lesser degree of influence on weight loss.

1.2.2 Second study: Isabelle Dedenon-Mayer (2008)

- **Study title:** Study of Nutritional Behavior Disorder in Obese Individuals (2008)-A thesis for obtaining a Doctor of Medicine degree at NANCY1 University of Medicine
- **Aim of the study:**to identify the observed eating behavior disorders recorded through a questionnaire of more than 800 obese people and to identify the most prominent disorders. The researcher also sought to develop and define questionnaires for eating disorder (DEBQ, BES, QEWP), and studied the possible link between eating disorders and the history of obesity among the study sample.

- **Method:** the researcher used the analytical method. The researcher used Dietary Behavior Disorder Questionnaires (DEBQ, TFEQ) and anthropometric measurements, questionnaires for eating behavior disorder (DEBQ, BES, QEWP), histoire alimentaire de 7 jours, and the researcher also depended on anthropometric measurements.
- **Sample:** the researcher relied on a sample of 701 persons aged 14 years and over.

Results

- The prevalence of BED in the study population was 18.5%, rather high.
- The results showed that obese people who have (Cognitive restriction – External eating) are more likely to have BED compared to obese people who have cognitive restriction only.
- Individuals who score low (YoYo) are less anxious and depressed and enjoy less food intake compared to people who score higher.
- More than 55% of the sample members entered the stage of taking weight during childhood. Also, nearly two-thirds of the study sample were classified under obesity.

1.2.3 Third study:Jules Dessureault (2010)

- **Study title:**Determinants of obesity and overweight among Canadian youth (2010)- Québec University À Montréal Canada
- **Aim of the study:**Determine if there are economic and social factors that contribute to the emergence of both obesity and overweight.
- Assessing the prevalence of household food insecurity among different groups of the Canadian population.
- Collecting data on some health conditions, physical activity, socio-economic and demographic characteristics of the respondents.
- **Method:** the researcher used the analytical method. He relied on the anthropometric measurements (BMI),24-hour food recall, and the results of cross-sectional surveys since 2004 that were conducted on Canadian people.
- **Sample:** The researcher relied on a sample of2,900 people between 2 and 17 years old.

Results

- Lifestyles marked by lack of movement as the main determinant of common obesity among children aged 6 to 11 years and 12 to 17 years.

- Family factors (parental income and education, child sex, immigrant status etc.) played a more important role in children aged 12-17 years.

2 Methods

2.1 Sample

The research sample was selected randomly by a statistician who relied on the necessary statistical programs to extract the sample,and it was represented by the total number of students distributed over 13 secondary schools, as shown in the following table:

Table 01: shows the number of students in the study sample in Guelma state according to each institution

N°	Town	High school	N students	%	N Groups
01	Guelma	Mahmoud bin Mahmoud High School	180	%18.75	6
02		Elikhoua ben soileh	90	%9.37	3
03		Mehdjoub Abderrahmane	60	%6.25	2
04		Guelma El-Jadida	30	%3.12	1
05	Heliopolis	Azizi Madjid	60	%6.25	2
06	Belkheir	Belkhir	150	%15.62	5
07	Nechmaia	Tazir Med Saleh	60	%6.25	2
08	Hamemdbaghe	Ben youb Mohamed	60	%6.25	2
09	Lkhzhara	Ahmed braghtha	60	%6.25	2
10	Oued zenati	El-Jadida	90	%9.37	3
11	Ain regada	Boulehrofeetaybe	30	%3.12	1
12	Ain larbi	Braouiedoudi	30	%3.12	1
13	Ain ben beida	Djmilinouri	60	%6.25	2
	Total	**960**	%100	**32**	

In Table 1, the number of the study sample was determined to be 960 students, the researcher determined the number of students in each educational group to 30 students, the highest number of members of the sample of students in Mahmoud Bin Mahmoud High School by 18.75% and the lowest number of students involved in the study in three secondary schools by 3.12 %.

2.2   Materials

2.2.1 Body mass index
- The weight was determined by a scale of the type (seca 762)
- The length was measured with a measuring ruler (the height chart seca 220).

BMI is a method of measurement that allows to evaluate the relationship between body weight and height, while comparing the results with the tabular results of reference in order to determine the type of person, and it is calculated with the following relationship: BMI = Weight (kg) / height^2 (m).

2.2.2 Dutch eating behavior questionnaire
The Eating Behavior Questionnaire was used by (Van Strien et al., 1986) to assess different eating patterns. This questionnaire includes 33 elements, and it evaluates 3 factors characteristic of eating behavior (cognitive restriction, emotional eating and external eating). It has strong psychometric properties in terms of validity, objectivity, and internal consistency between the questions, and has been tested by Van Strien and his team on a large number of individuals to make sure of its validity and on all different weight classes (obese, overweight and normal-weight people)(Sarah, 2015).The tool was adapted according to the study population, where the researcher got the final version with 17 questions, so the axes were as follows:

- **Cognitive restriction:** eating excessively after a period of weight loss when giving up the cognitive solution to food. This axis includes 5 questions.

- **Emotional eating:** eating that is attributed to responding to emotional states of excitement, such as fear of anger or anxiety. This axis includes 7 questions.
- **External eating:** eating in response to external food signals, such as the appearance and smell of food. This axis included 5 questions.

After recording the students' answers, the researcher extracted the final result for each axis by collecting the marks of each question that had 5 choices or answers, where scores from 1 to 5 were awarded incrementally. If the average marks for the answers in the first axis were more than 3, then the student or the subject showed a cognitive restriction of eating. As for the second axis, if the average score of the answers is greater than 3,

then the subject shows emotional eating in response to the psycho-emotional stat. And in the third axis, if the average score of the subject was greater than 3, then it appears in response to external eating stimuli.

3. Results

3.1 characteristics of the study sample

Table 2: The mean and standard deviation of the sample members according to age.

Tools / Sample	Sex	Arithmetic mean	Standard deviation	Minimum age	Maximum age
960 students	Males 402	16.61	±1.04		
	Females 558	16.57	±0.97	15	18
	Both sexes	16.59	±1.01		

In Table 2, it appears that the minimum age value is 15 years and the maximum age is 18 years, which are the ages of 960 students of all sexes. The mean value was 16.59, with a standard deviation of $\pm$ 1.01.Including the sex factor, the arithmetic mean of the ages of male students was 16.61, with a standard deviation of $\pm$ 1.04, and the arithmetic mean of the ages of females was 16.57, with a standard deviation of $\pm$ 0.97.

3.2 BMI distribution test

Through the results of students 'height and weight measurements and the application of the body mass index equation to classify the weights of students, the results showed a set of values that take a specific distribution that requires confirmation to achieve statistical inference, where the researcher used the moderation test of distribution through the SPSS program. The following table shows the results:

Table 03: The modularity of the distribution for the BMI results.

	Modularity test						
	Kolmogorov-Smirnova				Shapiro-Wilk		
BMI	Df		Sig		Df		Sig
	1.1	960	1.2	0.119	1.3	960	1.4	0.119

Table 03and Figure 2 show the results of the moderate distribution test. The Kolmogorov-Smirnova test and the Shapiro-Wilk test were applied to

the values of 960 indicators for students; the Sig score for the first test was>0.05,and in the second test, the Sig was also>0.05.This indicates the existence of statistical significance where the values are moderately distributed.

3.3 BMI Results

Through the processes of taking weight and measuring height for each student, and after using the relationship of BMI, the researcher found the students' body classifications (obesity, overweight, and normal weight) and the table below shows the findings.

Table 04: The distribution of students according to BMI classifications.

N	Age	Body mass classification			Total	%
		Normal weight	Overweight	Obesity		
1	[15 -16]	89	85	2	176	18.33%
2	[16 – 17]	227	10	3	240	25.00%
3	[17 – 18]	251	93	4	348	36.25%
4	18	140	54	2	196	20.42%
Total		707	242	11	960	%100
%		%73.65	%25.21	%1.15		

The table shows the total number of students by category and age group. In the first stage, there are 2 obese, 85 students with overweight and 89 students in the normal weight category, with a total of 176 students (18.33%). As for the second stage, it includes 3 students in the obesity class, 10 students in the overweight category, and 227 students of normal weight, with a total of 240 students(25.00%).In the third age stage, 4 students were in the obesity category, 93 students were overweight, and 251 students had a normal weight, with a total of 348 students (36.25%).As for those who are at the age of 18 years, the results recorded 2 students in the obesity category, 54 students who were overweight, and 140 normal weight students, with a total of 196, with a percentage of 20.42%.

3.4 DEBQ Results

The researcher used this tool to determine the students' eating behaviors, which may be characterized by certain disorders related to body weight changes. After the questionnaires were recovered, the researcher worked to extract the marks of each subject according to the three dimensions of the aforementioned tool. The researcher gets the following results

Table 05: The arithmetic mean and standard deviation of the students' results in (DEBQ)

Tools DEBQ	arithmetic mean	Standard deviation	Minimum age	Maximum age
Cognitive restriction	2.56	±1.09	1	25
Emotional eating	3.02	±1.52	1	35
External eating	2.74	±1.16	1	25

Table 5 shows the arithmetic mean and the standard deviation of the students' answers to the items of each axis. Through his answer, each student obtains values ranging from 0 to 25.The mean of the cognitive restriction axis was 2.56 with a standard deviation of 1.09±. As for the second axis (emotional eating), the researcher obtained an arithmetic mean of 3.02 with a standard deviation of 1.52±, while the arithmetic means of the third axis (external eating) scored 2.74 with a standard deviation of 1.16 ±.

Through the table, we also note that the mean value of the second axis has exceeded the value 3, which indicates that the students tend to hear their emotions as a psychological-emotional response, while the signs of the first and third axes did not exceed the value 3.

3.5   Results of the relationship between DEBQ and BMI

From the data collected, the researcher relied on explaining the relationship between the results of (DEBQ) in its three axes and BMI through the following table, which gives a description of the relationship.

Table 06: The relationship of DEBQ to the body mass index of the sample.

BMI / DEBQ	Obesity	Overweight	Normal Weight	Total	%
Cognitive restriction	5	166	100	271	%28.23
Emotional eating	2	147	222	371	%38.65
External eating	5	101	228	334	%34.79

Table 7 shows the relationship between cognitive restriction of DEBQ and body mass index for the study sample; 28.23% had cognitive restriction, of which 5 were obese,whereas 166 are overweight, and 100 students are normal weight. The students who showed the tendency to eat as a result of emotional need were 371 students, or 38.65%, including two students who were obese, 147 students were overweight, and 222 students had a normal weight.As for the students who are distinguished by eating in response to external stimuli, there are 334 students, or 34.79%, of whom 5 are obese students, 101 students are overweight, and 228 are of normal weight.

3.6 Results of statistical analysis:

Through the results of the body mass index and its relationship to eating disorders (DEBQ) in adolescents and the data explained in tables (4, 6, 7) and the raw values of the research tools, as the results of the hypothesis were inferred by SPSS to confirm the significance and the relationship between the two variables based on what Follows:

The results of the ANOVA analysis of the regression significance test, as we find that the value of Sig is 0.000, which is less than the level of significance 0.05. Therefore, we reject the null hypothesis and accept the alternative hypothesis that indicates that the regression is significant, and thus there is a relationship between the independent variables and the dependent variable.

To determine the nature of this relationship through multiple regressions, it must be clarified through the correlation equation, as the results are evident in the following table:

Table 07: The statistics of BMI and its relationship to DEBQ.

DEBQ \ BMI	BMI	Correlation	nature of relationship	significance level	Sig
Cognitive restriction		0.197	Positive	0.05	0.000
Emotional eating	960	0.407	Positive	0.05	0.000
External eating		0.263	Positive	0.05	0.000

Through the multiple linear regression equation, the results showed that the correlation value was (0.197) for cognitive restriction, and it indicates a positive relationship between cognitive restriction disorder and body mass index, at the significance level of 0.05**.**Thus, the alternative hypothesis is accepted, and accordingly there is a statistically significant relationship between the variables; the decision is statistically significant (sig<0.05).

The results also showed that the value of the calculated correlation coefficient was (0.407) for emotional eating, which expresses a positive relationship between emotional eating disorder and body mass index, the decision is statistically significant (sig<0.05).

For external eating, the results showed that the value of the calculated correlation coefficient was (0.263), and it expresses a positive relationship between external eating disorder and BMI;the decision is statistically significant (sig < 0.05).

Table 08: The value of the multiple linear regression coefficients

DEBQ \ Tools	BMI	Regression coefficient	significance level	Sig
Cognitive restriction		0.197	0.05	**0.134**
Emotional eating	960	0.407	0.05	0.000
External eating		0.263	0.05	0.000

The above table shows that the value of the regression coefficient was (0.197) for cognitive restriction, and the decision was not statistically

significant because the value of Sig is 0.134 (Sig>0.05) Thus, there is no relationship between BMI and eating behavior disorders in the cognitive restriction axis of students. The regression value in the second axis (emotional eating) was 0.407 and the decision was statistically significant (Sig< 0.05); this confirms the existence of a statistically significant relationship between BMI and eating behavior disorders in the emotional eating axis.

As for the third axis of eating behavior disorders (external eating), the value of the regression coefficient in the dimension was 0.263 and the decision was statistically significant (Sig< 0.05), this confirms the existence of a statistically significant relationship between BMI and eating behavior disorders in the external eating axis.

Table 8 showed that all the coefficients were with a positive signal indicating a positive relationship between the variables, i.e. between the body mass index and the three axes for identifying eating behavior disorders.

Table 9 showed that the values of the regression coefficient for the independent variables on the dependent variable, the Sig value in all axes <0.05, evidence of a statistically significant relationship between BMI and eating behavior disorders. Whenever a student is disturbed, such as a conflict of motivation between cognitive and psychological options and biological requirements, that transforms eating from its basic functions into a function of pleasure or symbolism or in response to states of anxiety, depression, and loneliness, as well as in response to external stimuli of food and the absence of internal biological signals whenever the BMI value increases.

4. Discussion

The researcher relied on determining the body mass index according to IOTF standards in order to classify students by extracting overweight, obese, and normal weight. These are international standards that refer to the results of an extensive study conducted by a group of researchers in 1980 on a large number of individuals and in different countries (the United Kingdom, the United States of America, Brazil, Hankook, the Netherlands and Singapore)(COLE et coll , 2000).

The aim of using this tool is that the reliance of many epidemiological studies on it, which allows comparisons with the values of other

researchers in the world, is consistent with what was stated in a foreign study where these criteria were identified as an important means for making comparisons (CACHERA et coll. 1982).These values were also used in studies in Algeria conducted on different groups of society, similar to the study (TALEB, 2011), (Allem, et al., 2011), which was also adopted in the study (Belounis, 2013), (Dali & Abdi, 2016).

High-calorie foods and inactive lifestyles are among the main factors in weight gain, and there is growing evidence indicating that behavioral factors such as eating behaviors can also lead to overweight and obesity(Bryant, et al., 2008) (Véronique, et al., 2003)

Psychological theories of eating behaviors are also prepared as the theory of self-control (Herman & Mack, 1975), the external theory (Schachter & Gross, 1968), and the psychological theory of eating (Kaplan & Kaplan, 1957).It provided the basis for developing weight-related eating behavior questionnaires such as the Three-Factor Eating Questionnaire.

The (DEBQ) was used to determine the emotional behavior towards eating and its relationship to weight in adults through responding to the subjects' questions and extracting the result that determines their behavior towards food (Gallant, et al., 2013), (Mallory & Bärbel, 2017), (Susan, et al., 2017). These studies also demonstrated the reliability of the DEBQ work to detect eating behavior disorders in adolescents and adults (Anna-Karin, et al., 1997), (Bouba & François, 2001). The tool was used in Algeria in a 2009 study to assess eating behavior disorders (restriction of eating, emotional eating and external eating).This study was carried out on 30 Algerian obese subjects, 70 patients with type 2 diabetes, and 30 healthy subjects. The results of the study indicated that restriction and inhibition were associated with obesity and type 2 diabetes, compared with the normal subjects (Koceïr et all, 2009).

In another study by (Koceïr), part of it, he studied eating behavior disorders and their relationship to obesity and abdominal obesity, since these disorders lead to an individual overconsumption of fatty and sugary foodstuffs (Koceir, 2016).

The conflict of motivation between psychological cognitive options and physiological requirements and the transformation of food from its basic functions into a function of pleasure and symbolism, which leads to linking the need to eat with emotional states bypassing the biological needs and

external signals of eating. The researcher relied on (DEBQ) to evaluate this for students attending Guelma High Schools (15-18 years).

The results of data collection through the Dutch Eating Questionnaire (DEBQ) and its relationship to BMI showed that: 270 students had cognitive restriction (28.13%), 372 students (38.75%) had emotional eating, 334 students (34.79%) had external food, with the possibility that a student records the appearance of the three dimensions in his behavior.

In interpreting the relationship between body mass index (obesity, overweight and normal weight) and eating behavior disorder (DEBQ), the results showed that 5 obese students (0.52%) and 166 students (17.29%) had cognitive restriction of eating which may result, according to the researcher's belief, from the discrepancy in motivation between psychological cognitive options and physiological requirements. As these students scored a high number of times during the week for not being interested in their body weight, accepting the foods and drinks provided to them at any time, and they did not pay attention to food with low energy density, they consumed meals between main meals and in the evening or late at night. This resulted in high scores on this axis of over 5. While 100 normal-weight students (10.41%) had a disorder of the restriction type, the inference about the relationship between the first axis (cognitive restriction) and BMI was not statistically significant, meaning that there is no relationship between the variables (Sig>0.05). This is inconsistent with a study that showed a correlation between cognitive restriction and body mass index in children aged 10-14 years old; these children are not resistant to the tendency to eat (Baños, et al., 2011).

In another study on the relationship between cognitive factors, body image and eating behaviors of obese patients in Turkey on 70 obese people and 117 people of normal weight, the results showed that there are no statistically significant differences between obese and moderate-weight people in the axis of cognitive restriction ($P = 0.621$) (Hakan, et al., 2020).

A German study came on a sample of Germans aged 14 years and over who used (DEBQ) and showed that external eating is more prevalent in the German population and results in younger age groups recorded significantly higher degrees of emotional eating and external eating than older age groups. Overweight and obese individuals scored significantly higher on all the DEBQ sub-scales compared to normal-weight individuals

(Michaela, et al., 2016). This is in line with the researcher's findings that overweight and obese students scored higher than those with normal weight in the assessment.

As for the results of the students in the second axis (emotional eating), 372 students (38.75%) showed an emotional tendency towards eating, which is the highest percentage, of whom 150 students (15.62%) were overweight (obesity included) and 222 students (23.12%) were normal weight. In a study on the differences in the patterns of eating behaviors between overweight and normal-weight children and adolescents under the age of 18, it showed that 10.5% of the study sample (2474 children and adolescents) who suffer from overweight have an emotional eating. Male adolescent students scored lower than females; the results were statistically significant (P=0.001) (Caroline, et al., 2008).

In another study conducted in Los Angeles County on 617 adolescent students, it revealed that emotional eating is related to the frequency of eating sweet foods rich in energy as well as salty foods that are dense in calories, such as chips. These are overall linked to the risk of overweight and obesity (Selena, et al., 2007), Which is consistent with the researcher's findings. The results of the study recorded in this axis and its relationship to the body mass index (obesity, overweight and normal weight) show that there is a significant correlation (Sig=0.000) between the variables and according to multiple linear regression, and that there is a statistically significant relationship between the BMI and the axis of emotional eating (Sig=0.000).

Students who have high scores of emotional eating and who have overweight (obesity include) and according to their answers to the questions of this axis, they have negative feelings inside them such as tension, discomfort, depression and anxiety as well as the feeling of loneliness that makes them confuse emotional need and nutritional need. This prompts them to take meals outside the main meals, which are characterized by energy density, in line with what was mentioned in the study (Selena, et al., 2007).

The results of the third axis (external eating) and its relationship to the body mass index (obesity overweight and normal weight) recorded 334 students with external eating (34.79%) of whom 106 students (11.04%) are overweight (obesity included) and 228 students (23.75%) are normal

weight. In a study on a sample of 1230 Chinese adolescents, the results showed that 932 students had a normal weight, 168 were overweight, and 71 were obese students according to BMI; correlation results were statistically significant (P <0.001) between DEBQ axes(external eating)and BMI(Siyao, et al., 2016). This corresponds to what the researcher found about the relationship of this dimension and its correlation with the BMI.

Another study showed the opposite on a sample of the Dutch community that consisted of 1342 (717 have a normal weight, 625 are overweight) of different ages looking for the relationship between the IMC and the results of the Dutch eating questionnaire. The results showed a very weak correlation between the variables that has no statistical significance as well .There were no statistically significant differences between overweight and normal-weight individuals in this dimension (P = 0.092) (Tatjana, et al., 2009).

According to the results of statistical inference and the use of the linear regression coefficient, the results showed a statistically significant relationship between the body mass index (obesity, overweight and obesity) with the external eating axis (Sig=0.000) as a result of allergy to food in terms of appearance or smell. In addition, there was an absence of internal physiological signals (Hunger and satiety), and heading to eat under the influence of an external signal resulting from the appearance of food that appears to the student from its appearance or smell, or with the company of a person eating a meal.

Also, according to previous studies, we found that obese and overweight adolescents scored significantly higher than normal-weight adolescents in all three eating behaviors (Baños, et al., 2011), (van Strien, et al., 2012) and (Michaela, et al., 2016). A previous study also recorded that BMI is associated with emotional eating, external eating, and cognitive restriction, and the results were statistically significant (P=0.03) (Michaela, et al., 2016), which is consistent with the researcher's findings regarding the association of BMI with (DEBQ) axes, the results were statistically significant.

Conclusion
Eating behavior disorders are related to the psychological aspect of the individual, which can describe the internal conflict between biological need for food and a psycho-mental state. It is expressed in the ability of the individual to restrict himself mentally by going to eat or in response to the

negative signals that the student may feel as a result of anxiety, depression, loneliness … or as a result of external food temptations (appearance and smell) in the student's psyche to go to eat this Food without taking into account body weight.

The researcher relied on DEBQ to search for eating behaviors that are characterized by (restriction, emotional eating and external eating). And its relationship to body weight changes in adolescent students, which may represent a disorder that contributes to the emergence of overweight and obesity through body mass indexes according to IOTF standards.

The results showed that 171 overweight pupils (obesity included), 17.81% had cognitive restriction of eating, exceeding the physiological need for food, and 150 students with 15.62% overweight (obesity included) showed emotional eating, which is due to the negative feelings. 106 students (11.04%), with overweight (obesity included) had external eating in response to external signals, bypassing the biological need. Cognitive restriction is not significantly correlated with overweight (obesity include) (Sig>0.05); scores do not increase with BMI, while Emotional eating and External eating were significantly correlated with overweight (obesity include) (Sig<0.05).These Eating Behavior Disorders are positively correlated with BMI (Sig<0.05).

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