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Research Article

Children's Eating Habits in Turkey: An Evaluation through Children's Eating Attitudes Test (ChEAT)

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Abstract

Background and Aim: Obesity in children is a global concern that requires immediate attention. The sedentary lifestyle leads to the onset and progress of obesity in children. Herein, a detailed survey was conducted on 637 students aged between 8 and 11.

Methods: The survey was done on children of either Turkish or Syrian ethnicity, who went to public and private schools and belonged to rich, medium, and poor socioeconomic backgrounds. Contour drawing scales were used to categorize the body type of the participants. Statistical analysis was conducted to understand the responses provided by the selected students on the 26 items according to the ChEAT questionnaire.

R**esults:** The results suggested that the students were aware of their health but were not ascertain about the relation between eating attitudes and obesity. A mixed response to the other's perception of their obesity was observed.

Conclusions: The present results supported the validation of the ChEAT questionnaire to evaluate the children's perspective psychometrically. The survey suggested adopting a scientific approach to improve the awareness of obesity among children.

Keywords: Obesity; Children's Eating Attitudes Test; Public Health; ChEAT

Introduction

Obesity has become a major health concern globally with an ever-growing number of cases. In children, the situation is not different compared to adults [1]. The estimation related to overweight or obese children suggested that 40 million children (≤5 years) are reported to be obese whereas for adolescents (5-19 years) obesity was reported for 330 million.

Such a serious situation warrants proper scientific exploration of the disease's cause and relevant remedies rapidly. Apart from genetic factors [2,3], several socioeconomic, environmental factors govern the onset and progress of obesity [4,5]. In the case of children, socioeconomic status [6], the influence of the home environment [7], the influence of the school environment [8], parental obesity condition [9] were reported to be associated with the obesity in school-going children.

However, the eating pattern [10], dietary intake, diet quality [11], food types, nutritional factors [12] were reported to be major eating habits associated factors responsible for obesity in children. Apart from eating attitude, the immense role of lack of exercise and a sedentary lifestyle can induce obesity in children [13,14].

Understanding the children's psychology regarding eating attitudes and their body type is important to prevent them from over-eating, have a proper and healthy diet, perform physical activities, and prevent obesity. Various psychometric scales are used to understand children's psychology in different age groups and with relevance to different aspects. Psychometric evaluation of the children has been done for emotional regulation during adolescence [15], emotional awareness [16], child behavior according to the DSM related scales [17], and eating habits [18]. The ChEAT questionnaire with 26 simple questions can evaluate the psychology of children regarding their eating attitudes and perception of their body type and feelings about others' opinions on their body type [18]. Several earlier studies were conducted on evaluating the eating attitudes of children using this psychometric scaling system where apart from the questions provided in this test, additional parameters were also considered for analysis and correlation [19].

In this study, we report an analysis of 637 students (aged 8-11) conducted using the ChEAT 26 questionnaire and contour body drawing scaling analysis. The objective of the study was to understand the psychology of the children regarding their eating atti-

tudes along with their perception of their body type. Further, we attempted to understand any possible relation of these responses with the contour drawing scale statistically. The current study is the first of its kind to be done in Turkey.

Methods

Study participants and sampling

The present study contains school-going Turkish and Syrian students who were of aged 8 to 11 years. All students were selected based on the decided inclusion and exclusion criteria as mentioned in the following section. The analysis was conducted on the students from 8 numbers of schools.

Ethics consideration

Ethical committee permission was obtained from Beykent University Social Sciences Ethics Committees before data collection (29072019/14). The regional directorates of the schools were informed with a permission letter obtained from the District Directorate. Informed consent was obtained from parents of the school children, stating clearly the objectives of the study. Verbal consent was obtained from the school children and they were assured of confidentially.

Eligibility criteria

All children in the 8 school, Year 1 and Year 2 (aged 7–11 years) were eligible to participate in the survey. Each child received a letter with study details and a form requesting parental permission to participate in the study: consent forms were collected from schools by the study nutritionist. Students who were having any diagnosed disease were excluded from the study.

Statistical and linear regression analysis

All descriptive statistical analyses were conducted using SPSS (version 25.0). Data with numerical values are presented as mean (±SD) and all categorical data are presented as percentages. The linear regression analysis was done in R (version 4.0) where contour was considered as the independent variable. Statistical diagnosis of the linear regression analysis was considered using the residual values, normal Q-Q plot, and Cook distance.

Results

Study participants and study design

The present study was conducted on the school-going children of 8 School, Avcılar-Beylikdüzü-Büyükçekmece district of Istanbul city, who were studying in classes 2-4. Administrative support to conduct the study was considered from the school authority with prior permissions.

All participant students were thoroughly examined based on the selection criteria before their inclusion in the study. Students from 2 to 4 classes were selected because the fourth-year students had not yet taken the requisite examinations when this study was conducted. Further, the distribution of the students from the individual class was as follows: almost $1/4^{th}$ of each class was included.

In the present study, a total of 637 participants were selected based on their age group and other criteria as mentioned here. The dataset included both male and female students within the age group of 8-11 years.

All the selected participants were supplied with the questionnaire for answering the food habit and psychological behavior associated related questions. Each question's answer was graded following the Children's Eating Attitude Test (ChEAT) questionnaire formulation and further analysis was conducted.

Demographic data

The final results dataset contained the response of 637 participants. A detailed descriptive analysis was conducted on the data obtained for the study participants. In the present article, all numerical data are presented as mean (±SD), and all categorical data are shown as percentages. It was observed that out of 637 study participants, 349 (54.8%) were females and 45.2% (n = 288) were males (Figure 1A). Therefore, the female participants were slightly higher than their male counterparts in the study.

The participating students were considered for four different age groups, 8 years, 9 years, 10 years, and 11 years (Figure 1B). The distribution analysis of the age group of the study participants suggested that most of the students in this study were in the 9-years age group (n = 276, 43.3%), followed by the 8-years age group (n = 253, 39.7%), 10-years age group (n = 96, 15.1%), and 11-years age group (n = 12, 1.9%) (Figure 1B).

The students were further categorized based on their birthplace of the students, i.e., Turkey (n = 529, 83%), and Syria (n = 108, 17%). The majority of the students were having their birthplace in Turkey and 17% of the students were having Syrian (n = 108) origin (Figure 1C). In socioeconomic consideration, school type often remains a crucial factor that develops the child's psychology and behavior. Hence, an analysis of the school type for the students was conducted. It was observed that the majority (56.7%) of the students who participated in this study were from public schools (n = 361). On the other hand, the participating students from the private schools were 43.3% (n = 276) (Figure 1D).

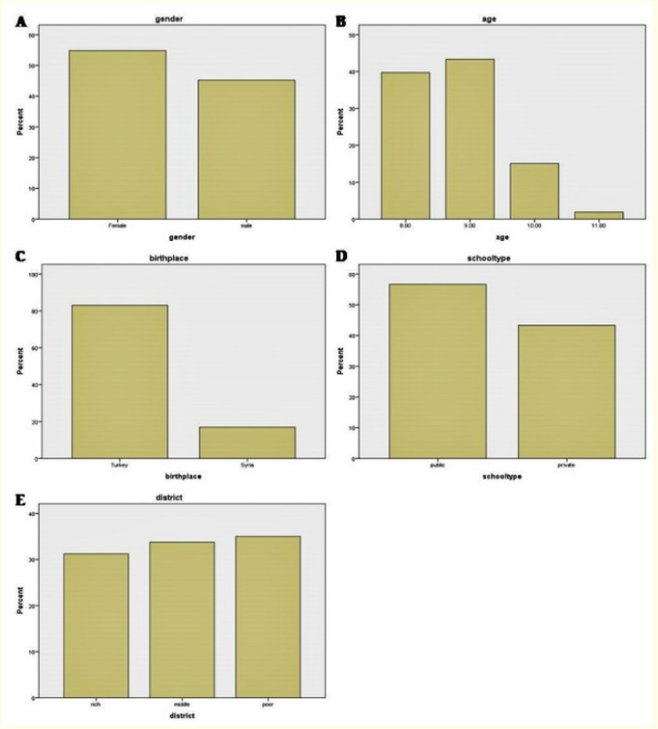

Figure 1: Demographic distribution of the students who participated in the study. (A) Distribution of the gender of the students, (B) Distribution of the age of the study participants, (C) Distribution of the birthplace of the students, (D) presentation of the school types of the students, and (E) presentation of the socioeconomic district distribution of the participants.

Further, we analyzed the socioeconomic factors based on the district the students belong to. The districts were categorized as rich, middle, and poor.

The majority of the participating students belong to the poor district (n = 223, 35%), followed by middle (n = 215, 33.8%), and rich (n = 199, 31.2%).

Data collection and children's eating attitude test (ChEAT)

All students who were participating in this study were requested to answer the questions provided in the ChEAT questionnaire where they were supposed to respond as per the provided options, i.e., 3,2,1, or 0, which reflects the responses as always (3), very often (2), often (1), sometimes (0), rarely (0), and never. All these responses were collected and presented in a spreadsheet for further analysis. The response percentage of the students for each question out of a total of 26 questions is provided in Figure 2 (Question1-Question 12) and Figure 3 (Question13- Question 26).

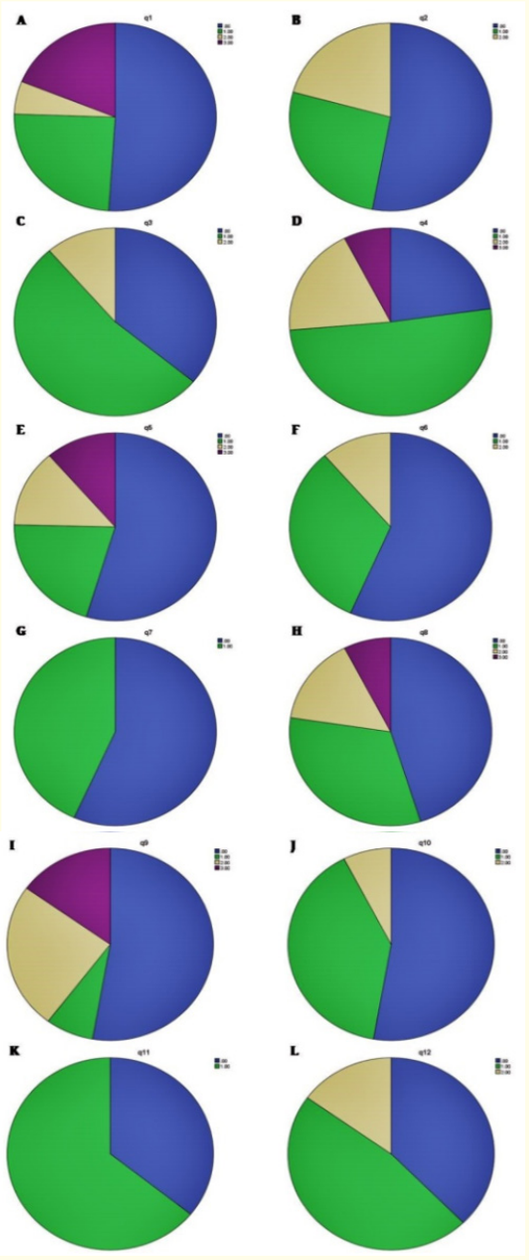

Figure 2: Survey outcome of the participating students based on the ChEAT questionnaire. Each pie chart shows the distribution of the answer received from the participating students where the obtained responses are always (3), very often (2), often (1), sometimes (0), rare (0), and never (0). The figure shows the responses from question number 1 to question number 12.

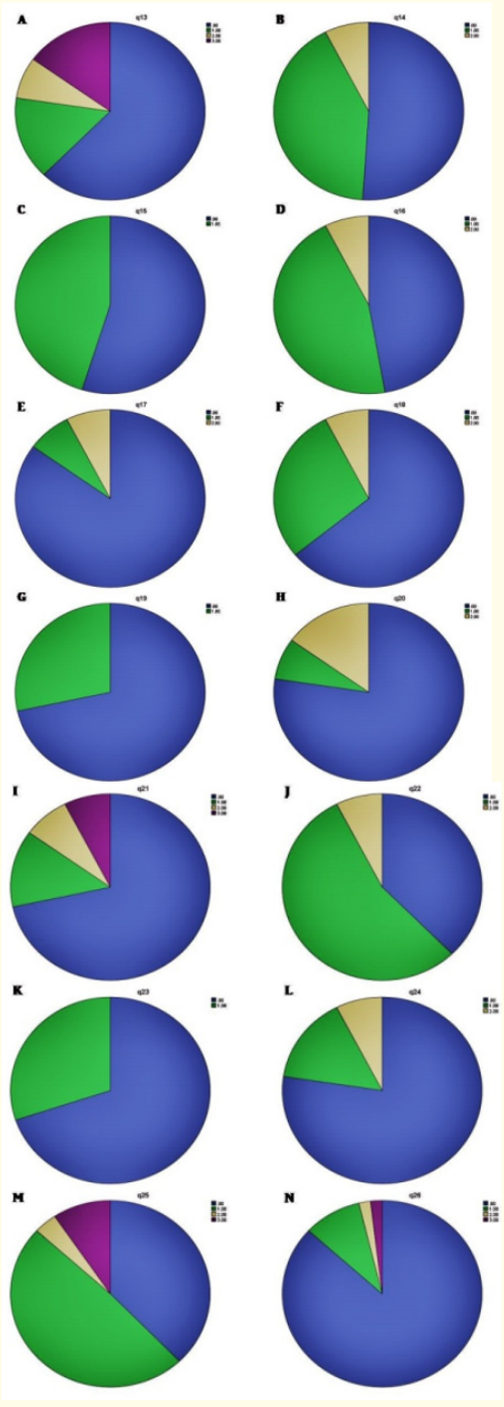

Figure 3: Survey outcome of the participating students based on the ChEAT questionnaire. Each pie chart shows the distribution of the answer received from the participating students where the obtained responses are always (3), very often (2), often (1), sometimes (0), rare (0), and never (0). The figure shows the responses from question number 15 to question number 26.

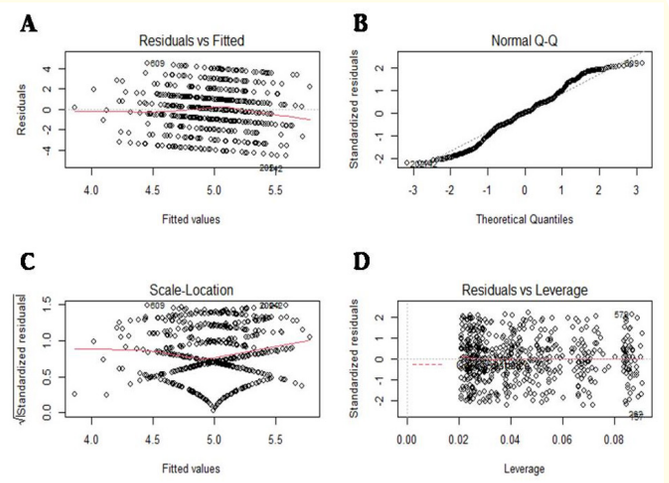

Figure 4: Outcome of the linear regression analysis. (A) The plot of the residual vs. fitted values. (B) Obtained Q-Q plot during linear regression analysis, (C) Scale location presentation of the fitted values against the root of standardized residuals, and (D) Plot of residuals vs. leverage.

Response evaluation of eating habits and retest analysis

The percentage distribution of the responses received from the participants for the ChEAT questionnaire is presented in Figure 2 and Figure 3. The majority of the study participants' views suggested that they are not much concerned about being overweight (Figure 2A). Altogether, 51% (n = 325) of students mentioned they are either ignorant or sometimes worried about their overweight problem (Figure 2A) whereas 18.8% (n = 120) of students showed constant concern about their overweight problem (Figure 2A). The majority of the students showed their attention toward food (52.9%, n = 337) while they are hungry, 20.7% (n = 132) participants showed an unusual mindset of keeping a distance from food while they are hungry (Figure 2B). Obsession with eating was not noted for the participants, however, 11.3% (n = 72) of participants showed thinking towards food very often (Figure 2C). Analysis of the binge eating behavior of the participants suggested that they are uncertain and may often opt for binge eating (n = 324, 50.9%) (Figure 2D). Eating habits depend on culture, socioeconomic condition, age, and other factors (20-23). In the present study, the observations suggested that the majority of the children do not bother much about the bite-size of their food (n = 348, 54.6%) (Figure 2E).

Awareness pertaining to the scientific understanding of the food, especially related to calorie consumption was observed for only

11.3% (n = 72) of the participating students. On the other hand, 56.5% (n = 360) of study participants were lacking awareness of the calorie content of the food (Figure 2F). Similarly, ignoring the specific type of carbohydrate-containing foods such as rice, bread, and potatoes were not observed among the participants and 56.7% (n = 361) showed a lack of interest or awareness about the role of high carbohydrate-containing food in obesity (Figure 2G).

The participants were also ignorant about the perception of others about their eating habits or eating pattern, and most of them (45.2%, n = 288) were not bothered by others' opinions about their eating patterns. However, 7.5% (n = 48) of students showed their consciousness about others' opinions on their eating habits (Figure 2H). Among the students, 15.1% (n = 96) reported having vomiting after eating, suggesting their wrong choice of either eating pattern or food (Figure 2I). Most of the students expressed having no guilty feelings regarding their eating habits (52.7%, n = 336) (Figure 2J). However, most of the students often want to be thinner (64.2%, n = 409) (Figure 2K). Hence, the obtained results suggest even though the students want to be thinner and they have consciousness of their obesity but they were not much aware of the relation between eating habits and obesity. On the contrary, they have awareness of the benefit of exercise in fat burning (47.3%, n = 301) (Figure 2L).

Only 15.1% (n = 96) had the view that other people have a perception of them as thin people whereas 62.3% (n = 397) were not of that opinion (Figure 3A). Similarly, these selected students were also not bothered about obesity personally (51%, n = 325), however, 7.5% (n = 48) students showed their concern about being obese (Figure 3B). Regarding eating time, most of the participants were not much aware (54.8%, n = 349), however, another 45.2% (n = 288) students accepted that they consider a long period to consume their food (Figure 3C). Even though they (participants) were not much aware of the calorie content of the food, the majority of them avoid sugar in food (52.7%, n = 336) (Figure 3D). Most of them showed ignorance about the food type, such as diet food (84.9%, n = 541) (Figure 3E). They don't agree that food controls their life (64.1%, n = 408) (Figure 3F) and opined that they can show self-control in eating (71.6%, n = 456) (Figure 3G). Interestingly, most of the participants took the responsibility for their eating habits and did not blame others (77.4%, n = 493) (Figure 3H). Further, in their eating habits, they did not involve much thought related to food (71.6%, n = 456), only 7.5% (n = 8) of participants agreed to have much thought regarding their food (Figure 3I). The consciousness about eating sweets was observed among most of the participants (54.8%, n = 349) (Figure 3J). Hence, their understanding of sugar and obesity was observed. In addition, only 30.1% (n = 192) of students mentioned that they do diet to control their obesity (Figure 3K). The majority of the participants did not bother about the emptiness of their stomachs (77.4%, n = 493) (Figure 3L). Even though they were aware of the obesity condition, an inclination toward new rich food was observed (49%, n = 312) (Figure 3M). In this study, related to new rich food intake, only >2% of participants mentioned having a vomiting tendency after eating (Figure 3N).

The retest analysis of the results provided the same results that confirmed the outcome of the ChEAT questionnaire-based analysis.

Contour analysis

Contour drawing rating scale varies between 1 and 9 where 1 is considered to be lean and 9 as obese [20] (Table 1). It was developed as an analysis tool of body image for assessment [20]. A correlated relationship between this body image assessment tool and BMI was observed [21]. We have used a similar measure to understand the probable distribution of the body images among the participating 637 students in this study (Table 1). Participants towards obese (rating scale 8-9) were 6.6% each on scale 8 and scale 9 (n = 42 each). The retest evaluation results were similar for scale 9 (6.9%, n = 44), however, it was almost half for scale 8 categorized group (n = 22) (Table 1). However, altogether most of the study participants were within the medium-scale values (4-6) in both the initial analysis and retest. An agreement was observed between the initial and the retest values in most of the cases (Table 1).

Statistical Linear regression analysis

Exploratory analysis of the data suggested that test values and retest values were equivalent and hence supported the obtained results. Further, linear regression analysis was conducted for all the parameters concerning the contour scaling results. Contour scaling was considered due to its equivalence to BMI which is an indicator of obesity.

The obtained results suggest equivalent distribution of the residuals, however, repetitive values were observed due to the data representation pattern (Figure 4A). The Q-Q plot (Figure 4B) showed better normal distribution of the data points. The Spread-location or scale location plot suggested the spreading pattern that may not be in favor of the assumption of equal variance (Figure 4C). Certain influential cases were detected that were beyond Cook's distance limit (Figure 4D). The regression model analysis showed the residual standard error of 2.091 on 610 df with a multiple R-squared value of 0.02042 and an adjusted R-squared value of -0.02133. The F-statistic obtained was 0.4891 on 26 and 610 DF, with a p-value of 0.9854.

Contour analysis scale	Frequency (Contour)	Percent (Contour)	Contour test evaluation	Frequency (Contour test)	Percent (Contour test)
1	43	6.8	1	44	6.9
2	43	6.8	2	45	7.1
3	43	6.8	3	38	6
4	127	19.9	4	126	19.8
5	127	19.9	5	148	23.2
6	127	19.9	6	126	19.8
7	43	6.8	7	44	6.9
8	42	6.6	8	22	3.5
9	42	6.6	9	44	6.9

Table 1: Contour analysis and Contour test evaluation of the participant students.

Discussion

Health management of the younger generation holds immense importance to developing a healthy upcoming generation in any population. The development of the future world depends on the younger generation [22]. Almost all school curriculums include various activities and sports for better health of the younger generation, but the present sedentary lifestyle and increase in junk food consumption of the children suggest otherwise [23,24]. Moussa., *et al*. (1994) suggested a long-ago association between BMI, fatness index, and waist-hip ratio [25]. Another study reported that a sedentary lifestyle, having obese parents, very limited or no exercise are some of the essential factors that could cause obesity in school-going children [26]. Low socioeconomic condition, absence of proper food was also reported to be associated with child obesity [27]. Therefore, obesity in children may have a different background from socioeconomic, lifestyle, to eating habits.

In the present study, we attempted to understand the children's psychological perception of obesity and their food habits through the ChEAT questionnaire response analysis [28]. A similar questionnaire was used the understanding children's eating attitudes, dieting behavior earlier [18,29]. The same questionnaire was used to validate the eating attitudes of Israeli and Finnish school-going children [30,31]. In Israeli children, the obvious gender difference was noted in the responses, similarly, variation was found in responses based on the grade of the student (grade3-grade11) [30]. The validated of the obtained results were confirmed for the ChEAT questionnaire analysis for the Finnish students [31]. Hence, the ChEAT questionnaire-based analysis was reported to be a validated method and effective for analyzing the eating attitude habits of children. The ChEAT questionnaire was also used to understand the psychology of overweight, at risk of overweight, and students who were in adolescence. For overweight children, this evaluation method was effective and appropriate [32].

Our results in the present study well reflected the mindset of the students who were part of the study. It was observed that most of the students were aware of the overweight concept; however, they do not have much information regarding the relationship between calorie intake and obesity. In addition, it was noted that the students were not much concerned about their specific eating patterns. However, they were having the intention to become thinner than their present physique. On the contrary, consumption of new rich and tasty food was found not to be a hindrance in their health management. The obtained results were reflected the same in the test analysis, confirming the accuracy of the results obtained. The linear regression analysis with a better R-square value with a larger dataset may suggest a plausible relation between the contour scale values and the question responses along with the demographic factors.

Therefore, from the present analyses, it can be inferred that even though the study participants were of age 8-11, they were aware of their body weight but they were not much interested to cut down their meal amounts or compromising their eating habits. Moreover, their concern about others' opinions regarding their obesity was negligible. A similar mindset among most of the students was observed probably due to their nearby and less age difference, and probably due to most of the students were within the medium (4-6) contour drawing scale values where the number of students who were marked as obese was only ~6.6%. Hence, the present study suggests the suitability of the use of the ChEAT questionnaire for obese, and near obese children. A study of this type is the first of its kind to have been conducted in Turkey.

Conclusion

The present study on 637 school-going children aged between 8 and 11 suggested that the considered children were not much concerned about others' opinions on their body type, however,

they were found concerned about eating sugar or sweets. A lack of scientific understanding about the onset and progress of obesity was observed as they were not able to relate calorie-associated information with body type or eating habits. Further studies may provide additional information in this regard with large-scale and diverse datasets.

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