INVESTIGATION OF THE PSYCHOMETRIC PROPERTIES OF THE PLATE CLEARING TENDENCY SCALE (T-PCTS) IN TURKISH ADULTS

Türk yetişkinlerde Tabak Temizleme Eğilimi Ölçeği'nin (T-PCTS) psikometrik özelliklerinin incelenmesi

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Abstract

It is thought that the tendency to finish all the food on the plate (plate clearing tendency) is a behavior that can be frequently observed in individuals and may increase the frequency of obesity. It was aimed to examine the psychometric properties of the Plate Clearing Tendency Scale (PCTS), which was developed to evaluate individual differences in plate clearing tendency, in a sample of Turkish individuals. The study was conducted with 333 adults (32.7% male, 67.3% female) aged between 19 and 64 years (mean 32.4±11.5). Individuals completed the questionnaire online. Validity and reliability analyses were conducted for the Turkish version of the plate cleaning tendency scale (T-PCTS). Confirmatory factor analysis was used to evaluate the factor structure of the T-PCTS, and reliability analyses and Spearman correlations were also examined. The one-factor structure of the T-PCTS showed good model fit and had acceptable internal reliability (Cronbach alpha and McDonald Omega ≥0.70). No relationship was found between T-PCTS and food cravings and its sub-factors (p>0.05). A negative and non-significant relationship was found between total T-PCTS score and body mass index (r=-0.022, p>0.05). T-PCTS is a valid and reliable instrument for measuring plate clearing tendency in Turkish adults. The tendency to clean the plate was not affected by immediate situations that guide eating behavior such as food cravings. Considering that long-term negative eating behaviors are effective in the emergence of obesity, the tendency to clean the plate may be shaped by past eating behaviors and may provide a new perspective on obesity management.

Keywords: Food cravings, obesity, plate clearing tendency, eating habits.

Özet

Tabaktaki yemeğin tamamını bitirmeye yönelik eğilimin (tabak temizleme eğilimi) bireylerde sıklıkla gözlenebilecek bir davranış olduğu ve obezite sıklığını artırabileceği düşünülmektedir. Tabak temizleme eğilimindeki bireysel farklılıkların değerlendirilebilmesi amacıyla geliştirilen Tabak Temizleme Eğilimi Ölçeği'nin (Plate Clearing Tendency Scale-PCTS) Türk bireylerden oluşan bir örneklemde psikometrik özelliklerinin incelenmesi amaçlanmıştır. Çalışma, 19-64 yaşları arasında (ortalama 32,4±11,5) 333 yetişkin birey (%32,7 erkek, %67,3 kadın) birey ile yürütülmüştür. Bireyler anket formunu çevrimiçi olarak tamamlamıştır. Tabak temizleme eğilimi ölçeğinin Türkçe versiyonu için geçerlilik ve güvenilirlik analizleri yapılmıştır. T-PCTS'nin faktör yapısını değerlendirmek için doğrulayıcı faktör analizinden yararlanılmıştır ayrıca güvenirlik analizleri ve Spearman korelasyonları da incelenmiştir. T-PCTS'nin tek faktörlü yapısı iyi model uyumu göstermiştir ve kabul edilebilir iç güvenirliğe sahiptir (Cronbach alpha ve McDonald Omega ≥0,70). T-PCTS ile besin isteği ve alt faktörleri arasında ilişki saptanmamıştır (p>0,05). Toplam T-PCTS puanı ile beden kütle indeksi arasında negatif yönlü ve anlamlı olmayan bir ilişki saptanmıştır (r=-0,022, p>0,05). T-PCTS Türk yetişkinlerde tabak temizleme eğilimini ölçmede geçerli ve güvenilir bir araçtır. Tabak temizleme eğilimi besin isteği gibi yeme davranışını yönlendiren anlık durumlardan etkilenmemiştir. Obezitenin ortaya çıkmasında uzun sürece yayılan olumsuz yeme davranışlarının etkili olduğu düşünüldüğünde, tabak temizleme eğilimi geçmiş dönemde yerleşmiş beslenme davranışlarına bağlı şekillenebilir ve obezite yönetimine yeni bir bakış açısı kazandırabilir.

Anahtar kelimeler: Besin isteği, obezite, tabak temizleme eğilimi, yeme davranışı.

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Introduction

Although the trend of increasing portion sizes started in the late 1970s, the portion sizes of foods served both at home and outside the home continue to increase and exceed nutritional recommendations (1, 2). The tendency of people to consume more food with increasing portion sizes is called the portion size effect (3). Although there are many factors contributing to portion size, it has been reported that the tendency of individuals to consume all the food placed on their plates is quite common (4). In one study, individuals consumed more than 90 per cent of the food served at meals (5), and in another study, it was reported that 90% of the food was consumed in 86% of the meals served (6). Although the tendency to clean plates as a standard habit is observed in most individuals, it has been reported that there may be individual differences such as gender, and men may be more prone to cleaning plates because women's perception of normal portions is smaller than men's (7).

The tendency to finish the food on the plate while eating may cause individuals to take in more energy than necessary and increase body weight. Especially in meals eaten outside the home, energy and nutrient requirements are often exceeded because the portions of the meals are not individualized; therefore, weight gain is inevitable in an individual who tends to consume all the food on the plate (6, 8). In a study conducted in a laboratory setting, it was found that individuals with a high tendency to clean plates had high nutrient intake, but the findings related to body weight were inconsistent (9). In some studies, it was observed that there was a positive correlation between high body mass index (BMI) and plate clearing tendency (PCTS) (10, 11), whereas in others, there was no correlation between PCTS and BMI (9, 12). In studies conducted, it was found that overweight individuals were more likely to consume all the food on their plates compared to underweight individuals (13, 14).

It is thought that the tendency to consume all the food on the plate while eating may be a learned behavior or reflect economic and moral concerns (15). Therefore, high tendency to clean the plate has been associated with food waste and high parental encouragement to finish the food on the plate during childhood (12, 16). In their study, Ruddock et al. (5) found that the reason why individuals finished all the food on their plates after passing the satiety point was to avoid food waste. Robinson and Hardman reported that the tendency to clean the plate in university students was associated with avoiding food waste (11). A short self-report measure was developed by Robinson et al. to assess the tendency to clean the plate for finishing the food on the plate and was named as the Plate Clearing Tendency Scale (PCTS) (10). In this scale, it was assumed that the tendency to clean the plates in individuals was constant over time, and the internal reliability of the unidimensional scale was found to be good, Cronbach $\alpha>0.80$ (9-12).

Studies conducted so far have focused on the socio-demographic characteristics, anthropometric measurements and food waste concerns of individuals with a tendency to clean plates, and it has been reported that there is very limited information on the links between the scale and eating behaviors (4, 7, 9, 10). Food cravings, defined as a strong desire to eat, is one of the factors that shape individuals' eating behaviors and it has been reported that more than 90% of the population may have experienced food cravings at some point in their lives (17). Food cravings are clinically important because it has been reported that food consumption is high in individuals with excessive food cravings, resulting in increased body weight over time and lifelong high BMI (18). In addition, in a study, it was found that persistent and high food cravings in adults may be associated with a tendency to clean the plate (19). Therefore, in this study, it was aimed to validate the plate clearing tendency scale in a sample of Turkish adults, to determine whether plate clearing tendency is a risk factor for obesity, and to reveal the relationship between food cravings and plate clearing tendency, which may trigger body weight gain.

Material and Method

Adaptation protocol

In order to adapt the scale into Turkish, permission for the use and translation of the scale was obtained from Robinson E. (10), one of the creators of the scale, via e-mail. In order to adapt the T-PCTS to Turkish, first of all, the original form of the five-item scale was translated into Turkish. The standard translation-back-translation method was used in the translation process of this questionnaire (20). The consistency and semantic integrity of the translated forms were evaluated by experts in the field of Nutrition and Dietetics, and the adaptation process of the scale was finalized after necessary corrections were made. In addition, a pilot study was conducted on 30 people in order to determine the intelligibility of the items in the scale. Data collected in the pilot study were not included in the analyzes of this study.

Participants

The sample of this study consisted of 333 adults aged 19-64 years living in Turkey who volunteered to participate in the study. In the adaptation of a scale to a different language and culture, the recommended sample size to determine its validity and reliability should be at least 5-10 times the number of items in the scale (21). Data were collected with an online questionnaire using snowball sampling method in order to reach as many individuals as possible. Ethics committee permission dated 20/11/2023 and numbered 21/141 was obtained from Ankara University Rectorate Ethics Committee for the study.

Instruments

Questionnaire form

Information on demographic characteristics of the individuals such as age, gender, education level, income level and occupation were collected online with a questionnaire form. Information on height (cm) and body weight (kg) were obtained based on the declarations of the individuals. Body mass index was calculated as kg/m^2 by dividing body weight by the square of height.

Plate Clearing Tendency Scale (PCTS)

Robinson et al. (10) developed a 5-item self-report questionnaire to assess individuals' habits towards finishing the food on their plates. Although Robinson et al. (10) did not use a specific name for this scale they developed, the scale was named as "Plate Clearing Tendency Scale" by the researchers who adapted the scale into German (4). In this study, the 5-item Turkish adapted version of PCTS, which composed of one factor was used. The scale is scored as a 5-point Likert scale ranging from 1=strongly disagree to 5=strongly agree and there is no reverse coded item. The total score is calculated by summing all five items, with higher scores representing a stronger tendency to clearing plates. The internal reliability of the original scale was found to be Cronbach α>0.80 (good) in several studies (9,11,12).

Short Form of Food Craving Questionnaire-Trait (FCQT-R)

It is a scale consisting of 39 items developed by Cepeda-Benito et al. (22) to measure and evaluate the eating desires of individuals. Meule et al. (23) revised and prepared a 15-item short form in German individuals. In this study, the Turkish version of FCQT-R was used (24). The scale consists of 15 items and 2 sub-factors (preoccupation with the thought of eating, loss of control over eating). It is scored on a 6-point Likert scale. Items 3, 4, 5, 6, 7, 10, 12, 13 and 14 of the scale measure preoccupation with the thought of eating; items 1, 2, 8, 9, 11 and 15 measure loss of control over eating. The scale has a score range from 15 to 90. Low scores indicate low food cravings and high scores indicate high food cravings. This scale Cronbach alpha value calculated for 0.94.

Statistical Analysis

For the analysis of the data obtained from the study, the SPSS 22.0 and AMOS programs were used. Within the scope of the research, in the description of the information about the demographic characteristics of the participants, minimum value, maximum value, mean and standard deviation statistics were used for continuous variables; percentage frequency statistics were used for categorical variables. Confirmatory factor analysis was performed to determine the construct validity of the adapted PCTS scale (10). In order to decide on the appropriate estimation method in confirmatory factor analysis, Mardia test was calculated in the

evaluation of multivariate normal distribution (Mardia test result=13.070) and it was determined that multivariate normal distribution was not provided because it was greater than 3. Since the assumption of multivariate normal distribution was not met, robust maximum likelihood estimation method was used. In addition, corrected item total score correlations were calculated in order to examine the discrimination of the scale items. The item discrimination of the scale scores according to the lower and upper 27% groups were evaluated. In order to determine the reliability of the scale scores, Cronbach alpha and McDonald Omega coefficients were calculated in terms of internal consistency (25). The relationship between T-PCTS and FCQT-R scores was analysed by correlation analysis. Before correlation analysis, the assumption of normal distribution was evaluated with kurtosis and skewness statistics. Since PCTS scores were not normally distributed, Spearman correlation analysis was used to determine the correlation between the scales. Significance level was accepted as $p<0.05$ in all analyzes.

Results

Table 1 provides information about the socio-demographic characteristics of the participants. A total of 333 adult individuals between the ages of 19-64 participated in the study, 32.7% male and 67.3% female. The mean age of individuals is 32.4±11.5 years and the mean BMI is 24.2±3.9 kg/m^2. It was determined that 62.2% of the individuals had normal BMI and 36.3% had a overweight-obese BMI. Of the individuals who participated in the study, 51.9% were single, 76.9% had a university degree or higher, 25.2% were students and 61.6% declared that they had an income level above the minimum wage.

Table 1: Socio-demographic characteristics of individuals.

N = 333		**Min.**	**Max.**	$\bar{X}$	**sd**
Age (year)		19.0	64.0	32.4	11.5
Weight (kg)		43.0	130.0	69.2	14.8
Height (cm)		140.0	195.0	168.7	9.7
Body mass index (kg/m^2)		18.5	40.1	24.2	3.9
N = 333			**n**	**%**	
Gender	Male		109	32.7	
	Female		224	67.3	
Marital Status	Married		160	48.1	
	Single		173	51.9	
Education	Primary school graduate		16	4.8	
	High school graduate		61	18.3	
	University, master's or doctoral degree		256	76.9	
Occupation	Housewife		27	8.1	
	Officer		80	24.0	
	Worker		38	11.4	
	Self-employed		67	20.1	
	Student		84	25.2	
	Retired		9	2.7	
	Not working/unemployed		28	8.4	
Monthly income	Below minimum wage		98	29.4	
	Equal to the minimum wage		30	9.0	
	Above minimum wage		205	61.6	

Min.: minimum, Max.: maximum, $\bar{X}$: mean, sd: standard deviation, n: individuals number, %: percentage

Kaiser-Meier-Olkin (KMO) test was employed to test whether the sample size was adequate, and Bartlett's Sphericity Test was used to determine whether there was a correlation between the items, which is a prerequisite for factor analysis. Accordingly, the results of the KMO test statistics showed that the sample size was adequate (KMO=0.729). A KMO value of >0.50 indicates that the sample size of the related scale data is sufficient. According to the Bartlett Sphericity Test result, the level of correlation between the items was found to be sufficient to do a factor analysis (χ^2=301.700; p<0.001).

Confirmatory factor analysis was performed to determine the construct validity of the PCTS scale developed by Robinson et al (10). During confirmatory factor analysis, model-data fit was evaluated by examining fit index values, factor loading values and error variances. Fit index values, factor loading values (max-min) and error variance (max-min) values are presented in Table 2. In addition, the measurement model obtained as a result of the analysis is given in Figure 1.

Table 2: Confirmatory factor analysis results for T-PCTS.

							Factor Loadings		**Error Variance**	
	χ^2	χ^2/sd	p	CFI	TLI	RMSEA	Max.	Min.	Max.	Min.
Scale	5.13	1,28	0.275	0.94	0.94	0.029	0.76	0.36	0.87	0.36
Recom-mended		χ^2/sd≤3		≥0.90	≥0.90	≤0.080	≥0.30		≤0.90	

CFI Comparative fit index, TLI Tucker Lewis index, RMSEA root mean squared error of approximation

When Table 2 is examined, it is seen that χ^2/sd value is less than 3 and accordingly, it can be said that the model fits the data well. CFI and TLI values were found to be 0.94. The fact that these values are above 0.90 means that the model fits the data very well. The RMSEA index was found to be 0.029 and since this value is less than 0.080, it can be said that the model fits the data well according to this index. When the fit indices are evaluated in general, it is seen that the model fits the data for the unidimensional structure of PCTS adapted to Turkish culture. As can be seen in Figure 1, the factor loading values of all items in the scale are higher than 0.30 and the error variances are less than 0.90. Accordingly, it can be said that all items accurately measure the relevant dimension.

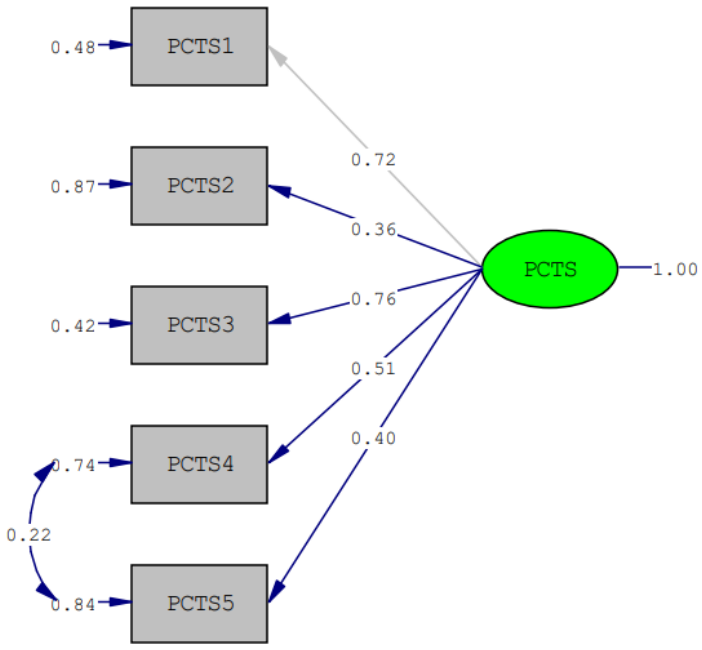

Figure 1: The fit scheme of T-PCTS.

In order to determine the item discrimination of the PCTS, the scale scores were sorted from the top to the bottom and those in the top 27% were divided into upper group and those in the bottom 27% were divided into lower group. The difference between the lower group and the upper group was analyzed by t-test. In addition, the corrected item-total score correlation analysis and reliability analysis results of each item are given in Table 3.

Table 3: T-PCTS item and reliability analysis results.

Item No	Corrected Item-Total Score Correlation	Upper Group		Lower Group		
		$\overline{X}$	sd	$\overline{X}$	sd	t
PCTS1. I always tend to clear my plate when eating.	0.507	4.90	0.37	3.01	1.41	12.294
PCTS2. I normally finish eating when my plate is empty.	0.326	4.47	0.77	2.76	1.34	10.542
PCTS3. Before I start eating, I normally plan to finish the serving I am about to eat.	0.540	4.96	0.21	2.92	1.35	14.113
PCTS4. I rarely leave food on my plate.	0.511	4.90	0.37	2.34	1.18	19.582
PCTS5. It is normal for me to have very little food left or an empty plate at the end of a meal.	0.431	4.91	0.36	2.97	1.43	12.488
	Cronbach's Alpha			**McDonald Omega**		
T-PCTS	**0.70**			**0.71**		

p<0.05

When Table 3 is analysed, it is seen that the corrected item-total score correlation values of T-PCTS vary between 0.326 and 0.540. As a result of the t-test between the upper group and the lower group, a significant difference was found for all items (p<0.05). Accordingly, it can be said that the items in the T-PCTS are successful in separating the individuals in the lower and upper groups. In addition, Cronbach alpha and McDonald Omega values of the scale are also given in this table.

When Table 3 is analysed, it is seen that Cronbach's alpha value calculated for T-PCTS scores is 0.70 and McDonald Omega value is 0.71. Since these values are greater than 0.70, it can be said that T-PCTS scores are reliable. Correlation analysis was calculated to examine the relationship between T-PCTS and FCQT-R scores. Since T-PCTS scores were not normally distributed, Spearman correlation analysis was used to determine the correlation between the scales and the results are presented in Table 4.

Table 4: The relationship between PCTS and FCQT-R scores.

		FCQT-R		
		Preoccupation with the thought of eating	**Loss of control over eating**	**Total**
T-PCTS	**r**	0.037	0.035	0.034
	p	0.496	0.523	0.533

Spearman correlation, p<0.05

When Table 4 is analysed, it is seen that there is no statistically significant relationship between T-PCTS scores and FCQT-R sub-dimension scores and total scores (p>0.05). The relationship between BMI values of the participants and PCTS total score and sub-factors is shown in Table 5. It was found that BMI was negatively associated with PCTS total, PCTS2, PCTS4 and PCTS5, positively associated with PCTS1 and PCTS3, and none of these relationships were statistically significant(p>0.05)

Table 5: The relationship between BMI and T-PCTS scores.

		PCTS-Total	PCTS1	PCTS2	PCTS3	PCTS4	PCTS5
BMI	**r**	-0.022	0.086	-0.101	0.024	-0.036	-0.035
	p	0.695	0.117	0.065	0.667	0.507	0.523

Spearman correlation, p<0.05

Discussion

This study was conducted to examine the psychometric properties of the PCTS developed by Robinson et al. in a sample of adult individuals (10). The adaptation process started with the translation of the scale from the original language into the target language. It continued with the determination of linguistic equivalence and then pilot testing. Finally, the Turkish version of the PCTS was administered to 333 adults and the data were analyzed. In this study, according to the results of confirmatory factor analysis, the χ^2/sd value for the one-factor structure is 1.28 and the model fits the data well.

CFI and TLI values were 0.94 and it was determined that the model fit the data very well. The RMSEA value is 0.029 and it can be said that the model fits the data well. When the fit indices were evaluated in general according to the confirmatory factor analysis results, it was revealed that a single-factor structure was supported in Turkish culture, similar to both the original PCTS developed by Robinson and colleagues (10) and the German version of the scale adapted by Nill and Meule (4). In addition, since Cronbach alpha and McDonald Omega values were ≥0.70 in this study, it can be said that internal reliability is good. Similarly, in some studies, the internal reliability of the scale was found to be >0.80, which is good (9-12).

Food craving is defined as an intense desire to consume a specific type of food and consists of multiple components such as cognitively thinking about eating, emotionally desiring food consumption, and behaviorally accessing and consuming food (26). It has been reported that the most prominent feature of food cravings is losing control during food consumption and constantly thinking about food consumption, and being constantly preoccupied with feelings and thoughts about food consumption during periods of increased emotional vulnerability in individuals pushes the individual to food intake (27). Therefore, food cravings may be considered as a factor that may affect individuals' tendency to clean plates. In the present study, although plate clearing tendency (T-PCTS) increased with increasing food craving as determined by FCQT-R total and sub-factor scores (preoccupation with the thought of eating, loss of control over eating), statistical significance was not found (p>0.05). Similarly, in the German adaptation of the PCTS by Nill and Meule, no relationship was observed between plate clearing tendency and eating behaviors such as food cravings and intuitive eating (4). This suggests that the T-PCTS is not affected by immediate situations related to food intake.

Although plate-clearing tendency is generally not associated with eating behaviors, it was found to be associated with dietary restriction in a study and PCTS scores were found to be higher in individuals with a history of unsuccessful dieting (9). Although there are a limited number of studies evaluating the relationship between plate clearing tendency and eating behavior (4, 7), this is the first study evaluating the relationship between food cravings and plate clearing tendency, which may affect eating behavior in Turkish adults.

Sheen et al. reported in their study that individuals with a high tendency to clean plates consume more food, so it can be

considered that a high tendency to clean plates may encourage overeating through food cravings (9). Increased food intake due to the tendency to clean plates has been associated with increased BMI in the long term (6, 11). It has also been reported that the tendency to clean plates and increase in food intake are more common in mildly obese and obese individuals compared to individuals with normal body weight (8, 13). In the studies conducted, it was found that the high tendency of individuals to clean plates based on their self-reports body weight was found to be associated with body weight (10, 11, 13, 14). In addition, Robinson and Hardman reported that the relationship between plate clearing and BMI was also observed when individuals' demographic characteristics and eating behaviors were controlled (11).

In this study, a negative relationship was found between T-PCTS and BMI, which was not statistically significant ($p>0.05$). It is thought that this may be due to the fact that portion sizes were ignored when evaluating the tendency to clean the plate. Because it is reported in the literature that foods served in large portions result in lower satisfaction by consumers, which may affect the tendency to finish all the food on the plate (28). In addition, considering that 62.2% of the individuals participating in the study had a normal BMI (mean 24.2±3.9 kg/m^2), it is expected that there was no significant relationship between BMI and the tendency to clean the plate. Similarly, no significant relationship was found between PCTS scores and BMI in some studies (9, 12).

Conclusions

This study demonstrated that the T-PCTS is a valid and reliable instrument for measuring the tendency to clean plates in the Turkish population. The tendency to clean the plate was not affected by situations that can change eating behavior instantaneously, such as food cravings. It can be thought that the behaviors related to nutrition that begin to be established in childhood and the tendency to clean the plate, which is not affected by momentary situations over time, may be a behavior pattern that is difficult to change and may be an important obstacle in the prevention and treatment of obesity. The study has several limitations and one limitation is that anthropometric measurements such as body weight and height, and thus BMI, are based on the declarations of individuals. The fact that the majority of the individuals participating in the study were at normal BMI may have prevented a clear demonstration of the relationship between BMI and the tendency to clean plates. Future studies should be conducted with a larger sample size with equal numbers of individuals in different BMI groups. Another limitation of the study is that only a measurement tool based on individuals' self-reports was used to assess the tendency to clean plates. In addition to the T-PCTS, it is thought that an observational assessment of individuals' tendency to clean plates may be important in terms of obtaining clear results.

Conflict of interests

The authors declare that they have no conflict of interest.

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Supplement: Tabak Temizleme Eğilimi Ölçeği (T-PCTS)

	1 (Kesinlikle katılmıyorum)	2	3	4	5 (Kesinlikle katılıyorum)
1. Yemek yerken her zaman tabağımdakileri bitirme eğilimindeyim.					
2. Normalde, tabağım boşaldığında yemek yemeyi sonlandırırım.					
3. Yemek yemeye başlamadan önce, normalde yemek üzere olduğum porsiyonun tamamını bitirmeyi planlarım.					
4. Tabağımda nadiren yemek bırakırım.					
5. Yemeğin sonunda tabakta çok az yemek kalması veya tabaktakilerin tamamen bitmesi benim için normaldir.					