

# Development of the Japanese Version of the Disordered Eating Attitude Scale (DEAS)

## —Validity and Reliability among Female University Students

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**Background:** Disordered eating attitudes and behaviors are experienced among young women in Japan as well as in many westernized countries. To understand the psychopathology of disordered eating attitudes toward food and eating, instruments that evaluate eating attitudes from different dimensions can be useful and contribute to the prevention of eating-related health issues in the general population. The aim of this study was to evaluate the validity and reliability of the Japanese version of the recently developed Disordered Eating Attitude Scale (DEAS).

**Methods:** The DEAS English version was translated into Japanese and the consistency of contents was confirmed. The DEAS Japanese version was applied to 144 female university students. Internal consistency was determined (Cronbach's Alpha), convergent validity was assessed by correlations with Eating Attitude Test-26 (EAT-26) and test-retest reliability was assessed with a sub-sample (n = 62).

**Results:** The internal consistency was .76. The DEAS total score was positively correlated with EAT-26 total scores (r = 0.53). The correlation between test-retest was r = 0.705. The Japanese version of DEAS showed an acceptable level of validity and reliability.

**Conclusion:** It is suggested the DEAS could be applied to Japanese females and used for further cultural comparison with Spanish and English speaking populations.

**Keywords:** Disordered eating, Eating attitudes, Eating disorders, Female university students

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### 1. Background

Disordered eating attitudes and behaviors toward eating and food are experienced by a lot of people (Ozier & Henry, 2011). Disordered eating attitudes and behaviors indicate problematic eating behaviors and subclinical conditions of eating disorders. Such attitudes and behaviors may not only cause development of clinical eating disorders pathology, but also affect eating habits and behaviors like food choices in people's daily life. It was reported that the prevalence of disordered eating in non-clinical

population was at least twice of that of clinical eating disorders (Shisslak et al., 1995). Evaluation of disordered eating in broader dimensions and prevention of these problematic behaviors have been more important as a primary care strategy.

To date, eating attitudes have been widely investigated in the field of eating disorders and other specific points (e.g. Garner et al., 1983; Aikman et al., 2006). However, these investigations did not sufficiently cover specific eating attitudes, including feelings and beliefs about food, eating and food choices in everyday life.

As well as many westernized countries, Japan has the increasing prevalence of eating disorders and disordered eating behaviors among young girls and women (Chisuwa & O’Dea, 2010). Many young Japanese women desire to be thin and attempt to lose weight regardless of their actual body shape or weight (Ministry of Health Labour and Welfare, 2009). This has been a public health concern which needs more attention and efforts (Takimoto et al., 2004).

However, the spread of subclinical eating disorders and underlying disordered eating behaviors is not fully paid attention to in Japan despite the severity (Takagi, 1999). One reason for this would be that fewer standardized scales are available for potential risk attitudes and behaviors in Japan. Major scales for assessment of eating disorders currently used in Japan are the Japanese versions of Eating Attitude Test-26 (EAT-26) (Shinzato et al., 1986; Mukai et al., 1994), Eating Disordered Inventory (EDI) (Nagata et al., 1994), Eating Disorder Examination (EDE) (Tachi et al., 2005) and Bulimic Inventory Test, Edinburgh (BITE) (Nakai, 1998). These scales are mainly developed for use in clinical settings; and the application of these instruments for screening in non-clinical settings is usually less sensitive, with false positive and negative cases (Hisamatsu et al., 2000).

Recently, Disordered Eating Attitude Scale (DEAS) was originally developed in Brazil to measure disordered attitudes and behaviors about foods and eating from subclinical perspectives (Alvarenga et al., 2010c). The scale showed a good correlation with EAT-26, but also indicated different dimensions of disordered eating behaviors (Alvarenga et al., 2010c). Later, it was applied to a screening survey among a large number of Brazilian university females and the study showed that the scale was adequate to identify a potential risk group of eating disorders with disordered eating attitudes in the general population (Alvarenga et al., 2010d). The English and Portuguese versions of DEAS were also validated in the US (Alvarenga et al., 2010b) and Panamá (Alvarenga et al., 2010a) and they showed good psychometric properties.

A Japanese version of DEAS could contribute to the understanding of subclinical disordered eating in the general population from different perspectives of EAT-26. Moreover, a comparison study between Brazil and US showed differences in feelings toward eating and ideas of normal eating (e.g. Alvarenga et al., 2010b). The DEAS is expected to explore more

cultural features of disordered eating in the Japanese population, compared with Spanish, Portuguese and English speaking populations as a standardized scale.

The aim of this study was to apply DEAS to a sample of young Japanese women in order to examine the internal consistency, convergent validity and test-retest reliability.

## 2. Methods

### 2.1. Development of the Japanese version of DEAS

The scale questions were evaluated through discussion by professionals in the field of nutrition, eating behaviors and eating disorders in Japan. The DEAS was determined to be suitable for use with the Japanese population. Development of the Japanese version of DEAS was approved by the authors of the original version.

There is no denying that some questions might not be well applied to Japanese food customs but they could still be accepted. For example, in question 1, which lists food examples (see, Alvarenga et al., 2010c), it could be affirmed that rice is very common in Japan, whilst beans are not eaten as a main food but are common enough. Like many other countries in the world, although French fries are not from the local traditional culture, it could be argued that since American fast-food habits are widespread in Japan (Asano et al., 2003), asking about fast-food consumption would be acceptable. Thus the differences were not considered a major problem for the application of DEAS.

The English version of DEAS was translated into Japanese by two researchers who were fluent in both English and Japanese. The translated Japanese version of DEAS was reviewed and reconciled with each other by three researchers until an agreement was reached among the three. Then, another researcher (who did not know about DEAS) translated the Japanese version of DEAS back into English independently. The original English version of DEAS and the back-translated English version were compared by a native English speaker (a university staff who supports international students) in order to confirm the accuracy of the translation. There were no discrepancies between the two versions. The English and the Japanese version of DEAS are shown in Appendix.

A pre-test was conducted with a group of Japanese undergraduate students in order to confirm that the translations were fully understood by the target population.

The DEAS comprises 25 questions in a style of Likert scale. The range of the total score of DEAS is from 37 to 190. Higher scores indicate a more disordered eating attitude. The scale was originally validated by Brazilian female undergraduate students and the internal consistency was 0.75. An exploratory factor analysis found that DEAS includes five subscales: 1) relationship with food; 2) concerns about eating and body weight gain; 3) restrictive and compensatory practices; 4) feelings toward eating; and 5) idea of normal eating.

## 2.2. Other measure: Eating Attitude Scale-26 (EAT-26)

EAT-26 was used to perform the convergent analysis with DEAS because it measures some specific domains of eating and was previously validated in Portuguese for use in Brazil (and also the same for Panamá and Japan).

EAT was originally developed with 40 items to measure anorexia nervosa by Garner and Gerfinkel (1979). Later, it was modified into a 26-item questionnaire with good validity and reliability compared to the original version (Garner et al., 1982). EAT-26 comprises 26 questions in a 6-point Likert scale from 1 (Never) to 6 (Always). In this study, the Japanese version of EAT-26 (Shinzato et al., 1986) was employed. In Japan, a score above 20 is used as the cutoff point of clinical eating disorders.

## 2.3. Participants

For the evaluation of the Japanese version, participants were Japanese female undergraduate students ( $n = 144$ ). Their majors were Human Science and Human Development at two universities in the Kansai area (an urban area). The survey was conducted as a self-administrative anonymous questionnaire survey. The participants were invited to complete the survey in person during a class through their lecturer with explanation, including informing them that their participation would not affect their grade for the class.

After the class, the participants voluntarily answered the questionnaires which included questions

of DEAS and EAT-26, and questions about their age, degree major, self-reported weight and height. Body mass index (BMI) was calculated and classified into categories defined by the World Health Organization (2006): underweight (BMI  $< 18.5$  kg/m<sup>2</sup>), normal weight (BMI between 18.5 and 24.99 kg/m<sup>2</sup>) and overweight (BMI  $\geq 25.0$  kg/m<sup>2</sup>).

## 2.4. Procedure of evaluation

All the procedures of the development and validation was the same as those of the original version of DEAS (Alvarenga et al., 2010c).

The instrument's internal consistency was determined by Cronbach's Alpha. For the evaluation of scale's reliability, a test-retest reliability was examined one month after the first evaluation, on a sub-sample students ( $n = 62$ ) of the main survey. These participants were randomly chosen from one of the universities which participated in the main survey. The Spearman's correlation coefficient ( $r$ ) was used to evaluate the total DEAS scores of the test and retest evaluation.

The convergent validity was assessed by correlations of DEAS with the score of the Japanese version of Eating Attitude Test-26 (Mukai et al., 1994).

## 2.5. Software and statistical significance

Statistical analysis was conducted using SPSS 15.0 (Statistical Package for Social Sciences, Chicago, IL, USA) for Windows. The level of significance was 0.05.

## 2.6. Ethics approval

The Research Ethics Committee of Graduate School of Human Life Science of the Osaka City University approved all the procedures of the study.

## 3. Results

**Table 1** shows the characteristics, total score and scores of each subscale of DEAS and EAT-26 of the participants. The range of age of the present participants was 18 to 22 years old and the mean of age was 19.7. The mean (SD) and range of BMI of the participants were 19.8 (1.93) and 16–25 as shown in **Table 1**. When the participants were classified

into three categories of BMI, 81.3% (n = 117) were categorized in a normal range weight, 18.1% (n = 26) were underweight and 0.7% (n = 1) were overweight.

The mean total score of EAT-26 was 12.1; in total, 14.6% scored above 20 points of clinical eating disorders symptoms.

**Table 2** shows the internal consistency of DEAS and the correlations between DEAS total score and five subscales scores with the EAT-26. The internal consistency of the Japanese version of DEAS was .76, indicating an acceptable level of reliability. Also, Cronbach's alphas of subscale 1 to 3 were 0.78, 0.70, and 0.61 respectively. However, alphas of subscale 4 were very low (0.11) and those of subscale 5 were relatively low (0.45).

The total score of DEAS showed a significant positive correlation with the EAT-26 score. Subscale 1 "Relationship with food," subscale 2 "Concern with food and weight gain" and subscale 3 "Restrictive

and compensatory practices" of DEAS also showed positive correlations with EAT-26. Subscale 4 "Feeling toward eating" and subscale 5 "Idea of normal eating" did not show a significant correlation with EAT-26.

Independent t-test showed no difference in mean age, weight, height and BMI between the participants in the test and retest evaluation. In the retest, the mean score of DEAS was 96.2 (SD 8.75; median 96; range 73–117). The test-retest Spearman correlation coefficient was 0.705 ( $p < 0.001$ ), indicating an acceptable reliability.

#### 4. Discussion

This study for validation of the Japanese version of DEAS was conducted with female university students, which is a similar population with the study for development of the original DEAS scale; the

**Table 1** Anthropometric characteristics and total and subscales scores of DEAS and total score of EAT-26

	Mean (SD); Median, range
Age (years)	19.7 (0.73); 20, 18–22
Weight (kg)	49.1 (5.64); 48.0, 38.0–65.0
Height (cm)	157.6 (5.86); 157.0, 144–170
Body Mass Index (kg/m <sup>2</sup> )	19.8 (1.93); 19.4, 16–25
DEAS total score	68.9 (12.92); 61.0, 45–122
Subscale 1: Relationship with food	21.5 (6.62); 23.0, 12–56
Subscale 2: Concern with food and weight gain	7.7 (3.00); 7.00, 4–18
Subscale 3: Restrictive and compensatory practices	7.5 (3.92); 6.0, 4–20
Subscale 4: Feeling toward eating	3.5 (1.37); 3.0, 3–11
Subscale 5: Idea of normal eating	28.7 (5.30); 26.0, 16–48
EAT-26 total score	12.1 (8.90); 12.1, 1–53

SD: Standard Deviation

**Table 2** Cronbach's alpha and Spearman Correlation Coefficients (SCC) of DEAS total and subscales scores with EAT-26

	Alpha	SCC with EAT-26 ( $p$ value)
DEAS total score	0.76	0.53 (<.001)
Subscale 1: Relationship with food	0.78	0.57 (<.001)
Subscale 2: Concern with food and weight gain	0.70	0.31 (<.001)
Subscale 3: Restrictive and compensatory practices	0.61	0.49 (<.001)
Subscale 4: Feeling toward eating	0.11	- 0.12 (0.890)
Subscale 5: Idea of normal eating	0.45	0.14 (0.092)



study found similar results regarding psychometric properties.

The age range in the present study was smaller than that in the Brazilian study (18 to 49 years old) but the median age was similar to the population for Brazilian and Panamanian validation: 20 years old (Alvarenga et al., 2010a; Alvarenga et al., 2010d).

Regarding BMI, the profile of the present sample included more underweight and less overweight students, which was different from the Brazilian, American and Panamanian ones. However, the profile of the present study showed a trend similar to the distribution of nutritional status obtained from the National Health and Nutrition Survey in Japan, with mean BMI of 20.7 kg/m<sup>2</sup> among young females aged 20–29 in 2008 (Ministry of Health, Labour and Welfare, 2009), 29.0% of underweight and 7.5% of overweight in 2010 (Ministry of Health, Labour and Welfare, 2012). Moreover, the mean BMI in this study (19.8 kg/m<sup>2</sup>) was consistent with previous studies which reported the mean BMI of females in the early 20s was 19.6–20.8 kg/m<sup>2</sup> (e.g. Hisamatsu et al., 2000; Nakamura et al., 1999).

Regarding disordered eating attitudes and behaviors, in the national survey in 2008, the results showed that 55.8% of women in their 20s engaged in weight control and 12.6% of women who were underweight also engaged in weight control (Ministry of Health, Labour and Welfare, 2009). In this study, 14.6% of participants showed clinical eating disorder symptoms and the mean score of EAT-26 was 12.1. The score lay in the range of the mean scores in the reported studies (9.47–16.99) shown in a review by Chisuwa et al. (2010). The results also indicate consistency with prevailing disordered weight control behaviors previously reported in the general population. This trend for thinness among young Japanese females is unique, compared to other Westernized countries (Wardle et al., 2006).

The methodology used in this first psychometric evaluation was the same used for the original scale and its English and Spanish versions, and the results showed that the scale had an acceptable and similar level of validity (Alvarenga et al., 2010a; Alvarenga et al., 2010b; Alvarenga et al., 2010c).

With regard to convergent validity, the total score of the Japanese version of DEAS relatively converged with EAT-26 (0.53) as compared to the Portuguese (original), English and Spanish versions which were 0.68, 0.65, and 0.54 respectively (Alvarenga et al.,

2010a; Alvarenga et al., 2010b; Alvarenga et al., 2010c).

Similar to the English and Panamanian versions, subscale 4 “Feeling toward eating” of the Japanese version did not show significant correlations with EAT-26 (-0.12); there was a weak correlation only in the Portuguese version (0.23) (Alvarenga et al., 2010c). For subscale 5 “Idea of normal eating”, there was no correlation (0.14), similar to the Portuguese and Spanish versions; there was a weak correlation (0.16) only in the English version (Alvarenga et al., 2010b). This implies that some questions in DEAS evaluate peculiar dimensions of eating attitudes that are not measured in EAT-26.

These results showed that the DEAS contains subscales that encompass somewhat different aspects of disordered eating which justify evaluating its validity in Japan. In particular, the result of subscale 5 “Idea of normal eating” largely relies on responses about daily food choices, which may have subtle cultural differences. Nevertheless the median score on subscale 5 “Idea of normal eating” in Japan was the same as that for Brazilians (data not published) and Panamanians (Alvarenga et al., 2010a); the median score of subscale 5 “Idea of normal eating” was higher just for Americans (34 vs. 26). Also, the original version of the foods listed at question 1 (that belongs to subscale 5 “Idea of normal eating”) was used in the English and Spanish validation with no adaptation either. Although rice and beans are not common in USA, the scale showed validity (Alvarenga et al., 2010b). As such, for this first application in Japan, it was decided that the scale would be used with no adaptation as well.

Nonetheless, since this first evaluation confirmed a basic validity and reliability with no change of questions, further adaptation from cultural perspectives is possible and necessary in order to use it for broader application in Japan.

Spearman’s correlation coefficient between the test and retest confirmed reproducibility of the scale. This evaluation was not performed in the Portuguese version, but the English and Spanish ones found similar results: 0.9 and 0.8 respectively (Alvarenga et al., 2010a; Alvarenga et al., 2010b). As for internal consistency, the result was similar to the Portuguese version (0.75) and studies in the US (0.76) (Alvarenga et al., 2010b) and Panamá (0.70) (Alvarenga et al., 2010a).

## 5. Conclusions

The acceptable validity and reliability of the Japanese version of DEAS show that it can be used to assess disordered eating attitudes in non-clinical settings among young Japanese female population from a new direction, including thoughts and beliefs toward eating in daily life. There is a limitation in the sampling method to generalize the results. However, the participants showed similarities in the profile of nutrition status and disordered eating attitudes as compared to previous studies conducted with the same age group. The results indicated the possibility of applying DEAS to a young female population. In a clinical setting, the DEAS would be better used with an existing scale to cover some aspects of specific clinical symptoms of eating disorders.

The Japanese version of DEAS is also expected to apply for a further study with other ethnic populations to reveal peculiar dimensions of eating attitudes. It is suggested that evaluation of disordered eating attitudes with DEAS could contribute to prevention of eating disorders in Japan.

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**Membership in Learned Societies:**

- The Japanese Association of School Health
  - The Japanese Society of Nutrition and Dietetics
  - Japanese Society of Public Health
  - Society for Nutrition Education and Behavior
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**Appendix: The English version and the Japanese version of Disordered Eating Attitude Scale**

**The English version of Disordered Eating Attitude Scale**

- 1a. How healthy and necessary do you consider consumption of sugar, oil and French fries?
- 1b. How healthy and necessary do you consider consumption of white meat, vegetables and fruits?
- 1c. How healthy and necessary do you consider consumption of breads, rice, pasta, beans, red meat, whole milk and cheese?
2. Do you feel pleasure when you eat?
3. Does eating ever feel unnatural to you?
4. Have you ever spent one or more days without eating or having only liquids because you believed you could lose weight?
5. Do you count the calories of everything you eat?
6. Do you enjoy the feeling of an empty stomach?
7. Do you “skip” meals to avoid putting on weight?
8. Does eating make you feel “dirty”?
9. Do you have good memories related to food?
10. Would you like to not need to eat?
11. Do you believe that it is normal to eat sometimes just because you are sad, upset or bored?
12. When you eat more than usual, what is your behavior afterward?
13. I feel guilty when I eat something that I thought I should not eat for some reason.
14. I quit eating a kind of food if I find out it has more calories than I thought.
15. I worry all the time about what I am going to eat, how much to eat, how to prepare food and whether I should eat or not.

**The Japanese version of Disordered Eating Attitude Scale**  
(日本語版食態度障害尺度)

- 1a. 砂糖、油、またはフライドポテトを摂取することについて、あなたはどのくらい健康的で必要だと考えていますか。
- 1b. 自身の肉（豚肉、鶏肉）、野菜、または果物を摂取することについて、あなたはどのくらい健康的で必要だと考えていますか。
- 1c. パン、米、パスタ、豆類、赤身の肉（牛肉、羊肉）、牛乳（無調整乳）またはチーズを摂取することについて、あなたはどのくらい健康的で必要だと考えていますか。
2. あなたは食べるときにうれいと感じますか。
3. あなたにとって、そもそも食べるということは不自然なことだと感じますか。
4. あなたは、今までに、体重を減らせると信じたために、何も食わずに、あるいは飲み物だけで1日またはそれ以上過ごしたことがありますか。
5. あなたは自分が食べるすべてのもののカロリーを計算しますか。
6. あなたは胃が空っぽだという感覚を楽しみますか。
7. あなたは体重が増えるのを避けるために食事を抜きますか。
8. あなたは食べているとき「下品だ」と感じますか。
9. あなたには食べ物に関連した良い思い出がありますか。
10. あなたは食べる必要がなくなっほいいと思いますか。
11. あなたは、ただ悲しい、落ち着かない、退屈だという理由で、何かを食べるということは正常なことだと思いますか。
12. あなたが普段よりも多く食べたとき、その後のあなたの行動はどうなりますか。
13. 私は何らかの理由で食べるべきではないと考えているものを食べるときに罪悪感を感じる。
14. 私は、その食べ物自分が考えていたよりもカロリーが多い種類のものだと分かったら食べるのをやめる。
15. 私は、何を食べるか、どのくらい食べるか、どのように食べ物を用意するか、そして食べるべきかどうかについていつも心配している。



16. I worry about how much a certain kind of food or meal will make me gain weight.	16. 私はその食べ物や食事がどの程度自分の体重を増やす種類のものかについて心配している。
17. I am angry when I feel hungry.	17. 私はお腹がすいているときに腹を立てる。
18. It is hard to choose what to eat, because I always I think should eat less or choose the option with fewer calories.	18. 私は、もつと少なく食べるべきかどうか、カロリーの少ない選択肢を選ぶべきかどうか、いつも考えているために、何を食べるのかを選ぶのが難しい。
19. When I desire a specific kind of food, I know I won't stop eating until I have finished it.	19. 私は特定の種類の食べ物が欲しいときに、それがなくなると食べるのを止められないとわかっている。
20. I would like to have my appetite and eating behavior under total control.	20. 私は自分の食欲や食行動が全面的に自分のコントロール下にあってほしい。
21. I try eating less in front of others in order to overeat when I am alone.	21. 私は、1人のときに過食をする目的で、他人の前では少なめに食べようとする。
22. I am afraid to start eating and not be able to stop.	22. 私は食べ始めると止めることができなくなることが心配だ。
23. I dream of a pill that would replace food.	23. 私は食べ物の代わりになる「錠剤」を夢見ている。
24. I get nervous and/or lose my self-control at parties and buffets, due to the great amount of foods available.	24. パーティやビュッフェでは、大量の食べ物が手にはいるために、私は緊張したり自己コントロールを失ってしまう。
25. My relationship with food messes up my life as a whole.	25. 食べ物との私の関係は、私の人生を全体的に台無しにしている。
Subscale 1 (Relationship with food) includes questions 8, 10, 13, 17, 8, 19, 20, 21, 22, 23, 24, and 25; Subscale 2 (Concerns about food and weight gain) includes questions 5, 14, 15, and 16; Subscale 3 (Restrictive and compensatory practices) includes questions 4, 6, 7, and 12; Subscale 4 (Feeling toward eating) includes questions 2, 3, and 9; Subscale 5 (Ideas of normal eating) includes questions 1a, 1b, 1c, and 11.	下位尺度 1 (食べ物との関係) には、8、10、13、17、8、19、20、21、22、23、24、25 の質問が含まれる。下位尺度 2 (食べ物や体重増加に関する不安) には、5、14、15、16 の質問が含まれる。下位尺度 3 (制限的および代償的行動) には、4、6、7、12 の質問が含まれる。下位尺度 4 (食べることへの感情) には、2、3、9 の質問が含まれる。下位尺度 5 (普通の食という考え方) には、1a、1b、1c、11 の質問が含まれる。