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LETTER

# Using Confirmatory Factor Analysis to Evaluate Construct Validity of the Indonesian Palatable Eating Motives Scale (I-PEMS)

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**Abstract:** The purpose of this work is to establish the validity of the Indonesian Palatable Eating Motives Scale (I-PEMS) and to describe the characteristics in palatable eating motives among current Indonesian young adults. The Original Palatable Eating Motives Scale (PEMS) was translated into Indonesian and back-translated into English to confirm the conceptual and linguistic equivalence. The scale was administered to emerging adults aged 18-25 years old. Confirmatory factor analysis demonstrated that the I-PEMS has an acceptable factor structure. The result provided evidence of four factors of palatable eating motives. No significant difference from the I-PEMS score between males and females. The association was only observed between the scores of Conformity motive and Body Mass Index.

**Keywords:** Factor analysis, Psychometric, Palatable eating, Motivation, Body mass index, Construct validity.

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## 1. INTRODUCTION

The tendency to gain weight is associated with two factors: 1) metabolic and 2) behavioral risk factors [1]. Examples of effects associated with metabolic factors are low basal metabolic rate, low energy cost of physical activity, low capacity for fat oxidation, high insulin sensitivity, low sympathetic nervous system activity, and low plasma leptin concentration. The second factor is behavioral factors related to energy intake and energy expenditure. Both can cause a positive energy balance, but aspects of the energy intake are considered to be more contributing to the positive energy balance. The behavioral risk factors can be in the form of patterns of eating behavior, hedonic events that guide and reinforce behavior, the strength of hunger and satiety sensations, or preferences for and selection of particular types of foods. Some of the diets associated with weight gain are disinhibition eating, binge eating, and eating in the absence of hunger. Preferences for and selection of particular types of foods also matter. Moreover, we are now living in an environment called food abundant environment.

Today, we live in abundant food environment marked by palatable foods that are abundantly and readily available [2 - 4]. Palatable foods are typically made tasty by its high ingredient of sugar, salt and fat and hence also tend to be dense in calories (burgees). Tasty foods are often consumed for non-homeostatic reasons. It supported by the opinion that palatable foods were generally taken to satisfy hedonic eating. Hedonic eating is the typical form of eating in the absence of hunger or metabolic needs [5 - 7]. Thus, it will lead to a positive energy balance.

Burgess tried to explore if the motive behind consuming palatable foods associated with obesity. They developed a scale named the Palatable Eating Motives Scale (PEMS) [8]. PEMS was constructed to probe the motivation for consuming palatable foods. PEMS measures motivation behind palatable food consumption with these specifications (a) eat for other reasons than hungry (b) very delicious, thus challenging to stop eating, (c) energy-dense, (d) facilitating weight-gain. PEMS asked participants to think of a time when they eat these foods, not when they consume too much [8]. PEMS consists of four subscales namely social, coping, reward enhancement, and conformity. PEMS has a good convergent validity with the YFAS food dependence score. It also has incremental validity to account variability in BMI.

The number of obese patients in Indonesia increasing at a rapid pace. Based on Indonesia's National Health Basic Research Data 2018, the number has doubled from 2007 to 2019 [9, 10]. The prevention, promotion, and also investigation program for this issue is undoubtedly needed, including the motive behind eating palatable foods. By knowing the motive behind eating palatable foods, it will be easier to make an effective program. Unfortunately, in Indonesia, there is little

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research that discusses the motivations behind the behavior of consuming delicious food.For this reason, it is necessary to validate the Indonesian version of PEMS. Therefore, the main objective of this study is to validate the PEMS measurement tools that have been adapted in Indonesian (I-PEMS). This study hypothesized that the I-PEMS possesses a structure similar to the original version [11].

## 2. METHODS

### 2.1. Participants

Participants included a total of 279 emerging adults. Forty-one students were excluded due to medical illness, including gastritis, asthma, and allergy. Thus, 238 students, 79% females, from a private university in Jakarta, Indonesia, aged 18-25 (19.76 years; SD=1.23) with a mean of Body Mass Index (BMI) of 22.2; SD=4.27, participated in this study. BMI was obtained from self-reported height and weight. All participants provided informed consent prior to participating in the study.

### 2.2. Measures/Questionnaire

Participants completed the following: The Indonesian Palatable Eating Motives Scale (I-PEMS) which was translated from the PEMS [8, 11] into Indonesian by Indonesian psychologist and independent professional translator. This translated version then discussed in a panel consisting of psychology doctoral students and psychology professors. After that I-PEMS was then re-translated into English by Indonesian psychologists fluent in English and professional translators.

The difference between PEMS and I-PEMS is only in the slightly unlike response descriptors and the palatable foods in the instructions. The PEMS yields four subscales or "motives" for consuming palatable foods: Coping, Reward Enhancement, Social, and Conformity (Table **1**).

**Table 1. Items, factor loadings, internal consistency, and means for the Indonesian Palatable Eating Motives Scale (I-PEMS).**

| Items | Coping | Reward Enhancement | Social | Conformity |
|---|---|---|---|---|
| 1.Saya mengonsumsi makanan/minuman untuk melupakan kekhawatiran saya. | 0.76 | | | |
| 4.Saya mengonsumsi makanan/minuman karena membantu saya ketika sedang merasa depresi atau gugup. | 0.83 | | | |
| 6.Saya mengonsumsi makanan/minuman untuk menghibur diri ketika sedang berperasaan buruk. | 0.88 | | | |
| 15. Saya mengonsumsi makanan/minuman karena membantu mengurangi tingkat tekanan/stres saya. | 0.84 | | | |
| 17. Saya mengonsumsi makanan/minuman untuk melupakan masalah saya. | 0.83 | | | |
| 7.Saya mengkonsumsi makanan/minuman karena saya menyukai perasaan yang ditimbulkan setelah mengkonsumsinya. | | 0.66 | | |
| 9.Saya mengkonsumsi makanan/minuman karena memberikan rasa semangat. | | | | |
| 10.Saya mengkonsumsi makanan/minuman untuk mendapatkan perasaan gembira. | | | | |
| 13. Saya mengkonsumsi makanan/minuman karena memberikan perasaan yang nyaman. | | 0.74 | | |
| 18. Saya mengkonsumsi makanan/minuman karena menyenangkan. | | | | |
| 3. Saya mengonsumsi makanan/minuman karena membantu saya menikmati sebuah pesta. | | 0.87 | | |
| 5. Saya mengkonsumsi makanan/minuman untuk bersosialisasi. | | 0.77 | | |
| | | 0.84 | | |
| 11. Saya mengkonsumsi makanan/minuman karena membuat acara kumpul-kumpul sosial menjadi lebih menyenangkan. | | | 0.61 | |
| 14. Saya mengkonsumsi makanan/minuman karena membuat pesta dan perayaan menjadi lebih baik. | | | 0.75 | |
| 16. Saya mengkonsumsi makanan/minuman untuk merayakan acara/peristiwa khusus dengan teman atau keluarga. | | | 0.78 | |
| 2. Saya mengkonsumsi makanan/minuman karena teman atau keluarga ingin saya memakan/meminumnya. | | | 0.56 | |
| 8. Saya mengkonsumsi makanan/minuman agar orang lain tidak membuat lelucon atau menggoda saya karena TIDAK memakan atau meminumnya. | | | 0.70 | 0.70 |
| 12. Saya mengkonsumsi makanan/minuman agar dapat masuk dalam kelompok yang saya sukai. | | | | 0.61 |
| 19. Saya mengkonsumsi makanan/minuman agar disukai oleh orang lain. | | | | 0.70 |
| 20. Saya mengkonsumsi makanan/minuman agar tidak tertinggal dibanding orang lain. | | | | 0.84 |
| | | | | 0.78 |
| Factor loading | 0.87 | 0.59 | 0.76 | 0.54 |
| Cronbach's α | 0.89 | 0.86 | 0.82 | 0.678 |
| Mean sample score* (SD) | 12.72 (4.91) | 15.15 (4.35) | 14.47 (4.11) | 8.49 (2.79) |

*Note:* * Items are scored 1 to 5 and averaged for the motive mean.

### 2.3. Statistical Analysis

Confirmatory Factor Analysis (CFA) was used to investigate the construct validity of the I-PEMS. Several fit indices were selected to test which CFA model best represents the present dataset: root-mean-squared error of approximation (RMSEA) (30), Comparative Fit Index (CFI) (31), chi-square, and change in chi-square given the difference in degrees of freedom between models. RMSEA is a measure of average of the residual variance and covariance; good models have RMSEA values that are at or less than 0.08 CFI [12]. CFI is an index that falls between 0 and 1, with values higher than 0.90 considered to be indicators of good fitting models [13]. When comparing models, a lower chi-square value indicates a better fit, given an equal number of degrees of freedom. MPlus7 and IBM SPSS Statistics version 21 were used for analyses.

## 3. RESULTS

### 3.1. Factor Structure and Reliability of the Indonesian Eating Motives Scale (I-PEMS)

Items with factor loading >0.40 were retained (presented in Table 1). Results from confirmatory factor analyses of the I-PEMS indicated acceptable-to-good fit of the factors to the data $X^2$ (df = 190, N = 238) = 5063.86, p < 0.000; RMSEA = 0.08 (90% CI 0.073, 0.092); CFI = 0.95; TLI = 0.94. Items compromising the four factors (motives) were the same as in the original, revised PEMS and Turkish version of PEMS [8, 11, 14].

### 3.2. Sex Differences in Scores of I-PEMS

Independent sample t-tests have been used to analyze differences of PEMS scores in two groups, male and female. The result is no difference between the two groups with respective scores: male (M = 49.42; SD = 13.09) and female (M = 51.23; SD = 11.54) and (t (236) = -957; p = 0.340).

### 3.3. Body Mass Index (BMI) and I-PEMS Score

The relationship between BMI and I-PEMS Score was analyzed using the Statistical Analysis of Pearson's Moment Product Correlation Coefficient. Initial analysis has been done and resulted in the conclusion that there were no mistakes in assuming the degree of normality, linearity, and homoscedasticity of the data. The analysis showed no correlation between the two variables (r = 0.59, n = 238 p >0.005). The relationship between each PEMS factor was analyzed, and the result showed that BMI only has a significant weak correlation with the conformity factor (r =.145, n = 238, p<0.05). The higher the BMI, the higher the conformity factor scores.

## 4. DISCUSSION

The results showed us that I-PEMS is valid to be used in Indonesian population. The hypothesis was accepted; the I-PEMS possesses a factor structure similar to the original version. The results also revealed exciting differences to those conducted in US population, but there were some similarities with the results conducted in Turkey. Social motives occupied the highest place for palatable eating motives in US population [11] while in Indonesia, eating delicious foods most often due to reward enhancements as found in Turkey [14].

According to Boggiano *et al*., (2015), Coping and Reward Enhancement can be characterized as internally-driven motives, while Social and Conformity are externally-driven motives. As mentioned above, in the US population the highest motive is externally driven, on the other hand, in Indonesia and Turkey the highest motive is internally driven. Another contrasting finding was also found which showed that if BMI is correlated to coping motives or internally driven in the US population (Boggiano, *et al*., 201), in Indonesia BMI has an association with externally-driven motive. The slightly different finding has been found in Turkey, BMI is correlated to both internally-driven (Coping) and externally-driven (Conformity) motives [14, 15].

## CONCLUSION

Eating behavior influenced by multidimensional factors, one of them is cultural differences [16]. The finding of this study supports that opinion. The validation of the PEMS into Indonesian (I-PEMS) is the right step, the scale can be used immediately to identify the main motive of eating palatable foods among Indonesian people or those with a similar culture. Thus, it will improve treatment prognosis and assist in the preparation of promotion and intervention programs in order to reduce obesity and NCD's.

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The research is approved by the Research Ethics Committee Universitas Padjajaran Bandung, Indonesia. No. 1176/UN6.KEP/EC2019.

## HUMAN AND ANIMAL RIGHTS

No Animals were used in this research. All human research procedures were followed in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

## CONSENT FOR PUBLICATION

Informed consent was obtained from all individual participants included in the study.

## AVAILABILITY OF DATA AND MATERIALS

The authors confirm that the data supporting the findings of this research are available within the article.

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## CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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Declared none.

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