

Original Article

Do demographic characteristics influence the eating competence of elderly Taiwanese?

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Background and Objectives: To investigate the association between demographic characteristics and eating competence (EC), “the behaviour and attitudinal conceptualization of eating”, among elderly Taiwanese. **Methods and Study Design:** Random questionnaire survey. Overall, 564 questionnaires were analyzed, and independent *t*-tests, analysis of variance, chi-square tests, were used to compare the differences in the EC scores when stratified by various demographic variables. **Results:** The mean score of both EC and non-EC (NEC) for all respondents was 29.3. Younger respondents (65-70 years old) reported significantly higher EC scores than did older respondents (71-76 years old) ($p < 0.05$). Similarly, respondents with high school or a higher education level reported higher scores than did respondents with elementary or a lower education level ($p < 0.001$), and respondents with partners had higher scores than did those with no partners ($p < 0.001$). Respondents who lived in urban areas reported higher EC scores than those living in rural areas ($p < 0.001$). No significant gender differences were found in both EC and NEC scores. **Conclusions and Implications:** Thirty-seven percent of elderly Taiwanese were not eating competent. Older respondents with higher education levels, those with partners, and those residing in urban areas showed significantly higher EC scores. Nutritional practitioners should therefore develop nutrition education programs tailored for those with low EC scores.

Key Words: eating competence, demographic characteristics, elderly, Taiwan

INTRODUCTION

The proportion of aged population is increasing rapidly worldwide, and Taiwan has one of the fastest rates of aged population growth. The elderly Taiwanese population increased from 6.2% of the total population in 1990 to 11.5% in 2013 and is estimated to be 19.1% by 2025.¹ The aging process is usually accompanied by nutritional problems.² A high proportion of older adults in Taiwan have inadequate dietary intakes, insufficient nutrition knowledge, poor nutritional attitude, and poor nutritional status.³ Individuals at risk of malnutrition experience greater functional decline in the future.⁴ Because of the improved diets and food diversity, the current elderly Taiwanese cohort has a greater chance of survival than did any cohorts in the past.⁵⁻⁷

The 1999-2000 Nutrition and Health Survey in Taiwan (NAHSIT) was an inclusive and comprehensive dietary research survey on elderly Taiwanese adults. The reliability and validity of the NAHSIT questionnaire has been verified.⁸ NAHSIT focused on elderly dietary intake by using a simplified food frequency questionnaire and a biomarker. Analyzing the cognitive and affective aspects of eating in a large sample size is difficult. Thus, the eating competence (EC) scale, a widely adopted instrument, was used to examine eating attitudes among elderly Taiwanese.

EC is the behaviour and attitudinal conceptualization of eating and is characterized by the positivity, comfort, and flexibility of an individual with the act of eating. The

“matter-of-fact, reliably getting enough to eat and enjoying nourishing food” is the most important part of EC.⁹ The EC model does not collect information on the dietary intake (i.e., the nutrients consumed) of individuals but examines their actual feelings toward eating. EC has been correlated with high diet quality,¹⁰ low risk for cardiovascular diseases (e.g., low blood pressure, low LDL cholesterol, and increased HDL cholesterol),^{9,11} self-reported physical activity,^{9,11-14} high sleep quality,¹⁵ and stronger food resource management skills¹⁴ and is less correlated with disordered eating.^{13,16} The EC population has low BMI, low body dissatisfaction, low drive for thinness, low dietary restraint, and less disinhibited eating.^{9,17} EC parents were better models, with higher self-efficacy and outcome expectancy and provision of more fruits and vegetables at their homes, than were NEC parents.¹⁸ EC parents not only influenced their own eating attitudes and behaviours but also those of their children.

In a study on EC among elderly participants in Spain,¹⁹ half the participants were categorized as EC. The mean

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EC score was 30.9 (maximum possible score=48). Women had lower scores than did men, especially on the eating attitude subscale. Gender differences were significant for 10 of the 16 EC items, with all men except 2 scoring higher. Men presented a more positive attitude toward eating than did women. Women were frequently concerned with their diet and were cautious about their nutrient consumption. No significant age and education differences were found between the EC and NEC elderly Spanish participants. Lohse et al.⁹ recommended studies on some groups, such as non-white or older people, to examine the usefulness of the EC score. Thus, in this study, the samples were recruited according to the recommendations of Lohse et al.⁹ The purpose of this study was to understand EC in elderly Taiwanese and to compare the demographic characteristics of the EC and NEC respondents.

METHODS

Sample and population

The sample consisted of 65-76-year-old community dwelling elderly adults from Taichung City, Taiwan. The sampling was based on the population census list of 65-76-year-old Taichung citizens as of December 2012 and was proportionate to the population of the 29 districts of Taichung. In addition, the gender ratio was representative of the population. This study was approved by the Institutional Review Board for the Protection of Human Subjects at Tunghai University.

Questionnaire development

This study was part of a project titled "Enhancing the Quality of Life and Living Environment in the Ageing Society (GREEnS Project 4)" sponsored by Tunghai University. The objective of this study was to understand the lifestyle of elderly adults in Taichung, such as their activities of daily living, food consumption, living style, leisure activities, social involvement and support, physical and mental status, current life quality, and future life expectation and living arrangement. The EC scale has been demonstrated to have construct validity and test-retest reliability for various types of respondents, such as adults without eating disorders, young adults, low-income

women, and elderly adults.^{3,9,20,21} The EC scale has 4 subscales—eating attitude (5 items), food acceptance (3 items), internal regulation (3 items), and contextual skills (5 items)—totalling 16 items (Table 1).^{9,22} Each item was rated on a scale of 5 levels of agreement—always, often, sometimes, rarely, or never—and scored 3, 2, 1, 0 and 0 points, respectively; thus, the EC score ranges from 0 to 48. Respondents with scores less than 32 are classified as NEC respondents.⁹ The captured demographic characteristics are age, gender, education, marital status, and type of residence area.

Because the EC has never been used in Taiwan, the scale required translation from English to Chinese. To ascertain the EC reliability of the translated scale, the back translation process was employed, and to ascertain whether the EC can be reliably administered to elderly Taiwanese, the face validity check was performed. Eight experts from relevant fields were invited to review the Chinese version of the EC questionnaire and the evaluation scale. Unclear or ambiguous question was rephrased by the experts.

After checking the accuracy and validity of the translated questionnaire, the research team pilot-tested it on 73 older adults.²³ The reliability coefficients (Cronbach's α ; $N=16$) of the translated scale was 0.74, slightly lower than that of the original EC scale (0.76).⁹ Cronbach's alpha scores for the eating attitude, food acceptance, contextual skills, and internal regulation subscales were 0.67, 0.66, 0.50, and 0.56, respectively, all lower than those in Stotts and Lohse²⁰ (0.80, 0.68, 0.66, and 0.69, respectively) and Lohse et al.⁹ (0.82, 0.70, 0.71, and 0.79, respectively); the lower reliability coefficients were most likely due to the smaller sample size in our study.

Data collection

Data were collected by experienced interviewers who interviewed the respondents in their homes. The duration of the interview was approximately 60 minutes. An incentive was given to the respondent for finishing the questionnaire. All questions were asked by the interviewers, and the answers were written in the code books. A supervisor examined the quality of the coded answers.

Table 1. Eating competence scale

	Always	Often	Sometimes	Rarely	Never
1. I am relaxed about eating.					
2. I am comfortable about eating enough.					
3. I enjoy food and eating.					
4. I am comfortable with my enjoyment of food and eating.					
5. I feel it is okay to eat food that I like.					
6. I experiment with new food and learn to like it.					
7. If the situation demands, I can "make do" by eating food I don't much care for.					
8. I eat a wide variety of food.					
9. I assume I will get enough to eat.					
10. I eat as much as I am hungry for.					
11. I eat until I feel satisfied.					
12. I tune in to food and pay attention to myself when I eat.					
13. I make time to eat.					
14. I have regular meals.					
15. I think about nutrition when I choose what I eat.					
16. I generally plan for feeding myself. I don't just grab food when I get hungry.					

Table 2. Older Taiwanese adults' mean demographic characteristic score for EC and NEC (n=564)

	N (%) Mean±SD	Eating Competent (EC)	Not EC	p-value
		(ecSI Score ≥32) N (%) Mean±SD	(ecSI Score <32) N (%) Mean±SD	
All	564 (100) 29.3±7.44	211 (37.4) 36.9±4.25	353 (62.6) 24.8±4.76	<0.001
Eating attitude (0-9) [†]	5.56±2.49	7.08±2.06	4.65±2.27	<0.001
Food acceptance (0-18) [†]	11.3±3.6	14.2±2.06	9.50±3.13	<0.001
Internal regulation (0-9) [†]	2.8±2.6	4.42±2.86	1.83±1.86	<0.001
Contextual skills (0-12) [†]	9.71±2.36	11.2±1.25	8.82±2.42	<0.001 [‡]
Age				
65-70 y	260 (46.1) [*] 30.2±7.53	120 (46.2) 36.7±4.11	140 (53.8) 24.6±4.77	
71-76 y	304 (53.9) [*] 28.6±7.30	91 (29.9) 37.2±4.45	213 (70.1) 24.9±4.76	
Gender				0.033 [‡]
Men	244 (43.3) 29.7±7.60	94 (38.5) 37.3±4.33	150 (61.5) 25.0±4.85	
Women	320 (56.7) 29.1±7.32	117 (36.6) 36.6±4.19	203 (63.4) 24.7±4.70	
Education				<0.001 [‡]
Elementary and below	361 (64) ^{***§} 28.4±7.31	110 (30.5) 37.0±4.41	251 (69.5) 24.6±4.66	
Middle school	73 (13) ^{***} 30.0±7.69	33 (45.2) 36.8±4.19	40 (54.8) 24.4±4.84	
High school and above	130 (23) ^{***§} 31.7±7.14	68 (52.3) 36.9±4.08	62 (47.7) 25.9±5.00	
Marital status				<0.001 [‡]
With partner (ex. Married...etc)	471 (83.5) ^{***} 29.7±7.47	185 (39.3) 37.1±4.31	286 (60.7) 24.9±4.66	
No partner (ex. Single, widow...etc)	93 (16.5) ^{***} 27.4±7.02	26 (28) 35.7±3.62	67 (72) 24.2±5.15	
Residential area				<0.001 [‡]
Urban area	199 (35.3) ^{***} 30.7±7.17	93 (46.7) 36.7±3.93	106 (53.3) 25.4±4.85	
Rural area	365 (64.7) ^{***} 28.6±7.49	118 (32.3) 37.1±4.50	247 (67.7) 24.6±4.71	

SD: standard deviation.

[†]Possible EC score[‡]Chi-square test[§]Post hoc test: education level for elementary school and below vs ≥high school were significant different from each other.^{*}*p*<0.05; ^{**}*p*<0.01; ^{***}*p*<0.001.

Statistical analysis

The mean and standard deviation of the total and subscale scores for the EC and NEC respondents were calculated and compared after stratifying into various demographic categories. Age, gender, education level, marital status, and type of residences area were considered the independent variables in the analysis. Independent *t*-tests and analysis of variance were used to test for significant differences among the demographic variables. A post hoc Tukey test was used to determine the significant pairwise differences in the independent variables, and the chi-square test was used to determine whether the observed sociodemographic values deviated significantly from the corresponding expected values. Cronbach's alpha analysis was used to assess the reliability and internal consistency of the 16 questionnaire items. All statistical tests were performed using SPSS 17.0, with the level of statistical significance set at *p*<0.05.

RESULTS

Of the 573 elderly adults who completed the survey, the responses of 564 were valid. Table 2 presents the demo-

graphic data of the respondents. The majority of the respondents were NEC respondents (62.6%), 71-76 years old (53.9%), women (56.7%), had elementary or a lower level of education (64%), had a partner (83.5%), and lived in a rural area (64.7%). The mean EC score of both EC and NEC respondents was 29.3. The mean EC score of older adults was 36.9, which was significantly higher (*p*<0.001) than the mean NEC score (24.8).

The overall Cronbach's alpha score of the EC respondents was 0.76, indicating the high internal consistency of the scale. Cronbach's alpha scores of the 4 subscales, namely eating attitude, food acceptance, internal regulation, and contextual skills, were 0.45, 0.74, 0.48, and 0.58, respectively; the scores of 2 subscales were less than 0.50 and were therefore inadequate. Thus, the authors used factor analysis to determine the load of each item. The other subscales exhibited adequate Cronbach's alpha scores.

Younger respondents reported significantly higher EC scores than did older respondents (*p*<0.05), especially for food acceptance (Table 3). A post hoc test was used to examine the intergroup differences, and the EC scores

Table 3. Mean Eating Competence Subscales Score (\pm SD) by socio-demographic categories

EC Subscale (Possible score)	Age		Gender		Education level			Marital status		Residential area	
	65-70 y (N=261)	71-76 y (N=304)	Men (N=244)	Women (N=320)	Elementary and below (N=361) [†]	Middle school (N=73)	\geq High school (N=130) [†]	With partner (N=471)	No partner (N=93)	Urban area (N=199)	Rural area (N=365)
Eating attitude (0-9)	5.62 \pm 2.55	5.51 \pm 2.44	5.66 \pm 2.51	5.49 \pm 2.47	5.29 \pm 2.55**	5.67 \pm 1.97**	6.26 \pm 2.43**	5.62 \pm 2.48	5.28 \pm 2.53	5.95 \pm 2.5**	5.35 \pm 2.46**
Food acceptance (0-18)	11.7 \pm 3.71*	10.9 \pm 3.47*	11.5 \pm 3.65	11.1 \pm 3.56	11.0 \pm 3.59*	11.4 \pm 3.79*	12.0 \pm 3.43*	11.5 \pm 3.59**	10.2 \pm 3.45**	11.8 \pm 3.40**	11.0 \pm 3.67**
Internal regulation (0-9)	3.01 \pm 2.73	2.62 \pm 2.49	2.83 \pm 2.63	2.78 \pm 2.58	2.55 \pm 2.59**	3.07 \pm 2.62**	3.35 \pm 2.55**	2.85 \pm 2.63	2.56 \pm 2.47	2.75 \pm 2.60	2.83 \pm 2.61
Contextual skills (0-12)	9.91 \pm 2.33	9.54 \pm 2.37	9.70 \pm 2.36	9.72 \pm 2.36	9.55 \pm 2.39	9.86 \pm 2.23	10.07 \pm 2.32	9.77 \pm 2.34	9.39 \pm 2.43	10.2 \pm 2.26**	9.47 \pm 2.38**

SD: standard deviation.

[†]Education level for elementary school and below VS high school and above were significant difference from each other.* p <0.05; ** p <0.01.

were found to differ significantly among the respondents when stratified by education level: older adults with high school or a higher level of education were found to have significantly higher EC scores than did those with elementary or a lower level of education ($p < 0.001$). When stratified by education level, significant differences were found among the groups in 3 of the 4 EC subscales, with contextual skills being the exception. Elderly respondents with partners had higher EC scores than did those without partners ($p < 0.001$), especially for food acceptance. Similarly, elderly respondents who lived in urban areas reported higher EC scores than did those who lived in rural areas ($p < 0.001$). When stratified by the area of residence, significant differences were found between the residential groups in 3 of the 4 subscales, with internal regulation being the exception. No significant differences were found among the respondents when stratified by gender. The 4 subscales differed significantly between EC and NEC respondents. The demographic characteristics were associated with EC or NEC (Table 2). The chi-square test revealed that elderly Taiwanese adults with EC were younger, tended to be men, had high school or higher educational levels, had partners, and lived in urban areas. The internal regulation subscale showed the lowest mean EC score (2.8 of 9).

DISCUSSION

The mean of both EC and NEC scores among elderly Taiwanese in this study (29.3 ± 7.4) was similar to that reported for elderly Spanish (30.9 ± 6.3)¹⁹ and U.S. respondents (31.1 ± 7.5).⁹ The proportion of respondents classified as EC in our study (37.4%) was lower than those in the Spanish (45.6%) and U.S. (46.1%) studies. The demographic characteristics were similar to that in NAHSIT (1999-2000). In this study, the proportion of respondents with high school or higher levels of education classified as EC respondents was slightly higher (23%) than that in NAHSIT (20%).⁷

Age (65-70 y vs 71-76 y) significantly influenced the EC scores of the elderly Taiwanese in this study ($p < 0.05$). Younger respondents reported higher EC scores (30.2) than did older respondents (28.6). Similarly for the food acceptance subscale, younger respondents reported higher scores than did older respondents. Furthermore, younger respondents were more open-minded regarding acceptance of different foods than were older respondents. The eating patterns of elderly Taiwanese are influenced by their eating customs and traditions.^{3,24} They preferred traditional Chinese food and made no attempt to adopt other cuisines as they grew older. Studies have also indicated that the Chinese tend to prefer traditional food.^{25,26} For example, when Chinese immigrants seek Chinese foods even after moving to other countries.²⁷

Post hoc testing revealed that when stratified by the education level, the EC scores of the elderly Taiwanese respondents significantly differed among the 3 education level groups, especially between the high school or higher and elementary or lower groups. Elderly Taiwanese with high school or higher education had higher EC scores in all subscales except for contextual skills. Researchers have demonstrated that elderly Taiwanese with higher education levels have more knowledge on food and eating;

furthermore, they exhibit positive attitudes toward eating and adhere to dietary restrictions.³ Low education level is a possible reason for low food acceptance among respondents, resulting in fewer opportunities to discover or try new foods. Elderly respondents with partners reported significantly higher EC scores for food acceptance than did those with no partners. Familial and social support are important factors for ensuring a healthy diet. Living and eating alone results in lower consumption of fruits and vegetables by the elderly.²⁹

The findings of this study revealed that elderly Taiwanese residing in urban areas showed significantly higher EC scores for all EC subscales, except for internal regulation, than did those who lived in rural areas. The population density of Taichung City is 8.6 times higher than that of rural areas ($6,622/\text{km}^2$ vs $763/\text{km}^2$). Elderly Taiwanese living urban areas have easy access to new foods, whereas those in rural areas do not. The intake of dairy products, meats, instant foods, snacks, and supplemental nutrients was reported to be significantly higher in the urban elderly than in the rural elderly residents.³⁰ In addition, elderly Taiwanese adults living in urban areas have more knowledge on nutrition than do those in rural areas.³ Less-healthy eating behaviours, particularly sugar beverage consumption, are frequent for residents of rural areas.³¹ Older rural adults have exhibited significantly lower self-rated healthy eating status, lower self-efficacy, and poor nutritional status than have urban older adults.³²

The internal regulation subscale among elderly Taiwanese adults showed the lowest EC score. The current generation of elderly Taiwanese adults was born around the end of the Second World War. This generation is widely believed to have experienced food shortage and to have learned to finish whatever was on their plate without complaining; because of their deprived childhood, these Taiwanese are in the first level of "enough food" in Satter's hierarchy of food needs.³³ Thus, improving their eating attitudes and behaviours from the first level of "enough food" to the sixth level of "instrumental food" is an important mission for nutritional practitioners. Satter³⁴ suggested that nutritional educators deliver such messages such "another meal or snack is coming soon for you." In addition, elderly Taiwanese believe that their health is subject to the will of God or to fate.²⁴ They do not believe that food affects their health. Thus, they eat whatever they prefer with no regard to dietary regulations. Studies have shown that elderly Chinese adhere to their religion-based preferences toward eating.²⁵ Irrespective of their medical conditions, the elderly Chinese believe that they have earned the "right" to indulge themselves and that they should enjoy life while they can²⁴; thus, their eating behaviours do not include restrictions on portion size or intervals between meals.

Some limitations of this study are as follows. First, the participants were selected through both random sampling and proportional sampling, depending on the census population of the rural and urban areas. Second, some selected participants could not be physically reached as they had safeguarded front doors or lived on the first floor of apartments with controlled access. Although the research team contacted the neighbourhood magistrate for assistance in contacting potential participants, the response

rate from the elderly who lived in apartments was limited, which might have biased our sampling. Third, generalizability to populations other than predominantly older Taichung citizens might cause sampling bias. Additional studies are necessary to apply the EC scale to other cities to obtain results representative of the entire Taiwan population.

A future study should consider including a food frequency questionnaire or 24-hour food records to measure actual dietary intake, which can capture the total amount of micro- and macronutrients consumed by elderly Taiwanese. This would enable the determination of the association between the cognitive and affective aspects of eating and the actual eating behaviour. Moreover, future studies should record physical activities of elderly Taiwanese. Furthermore, this study recruited community-dwelling adults, whereas those institution-dwelling adults were excluded. Therefore, institution-dwelling adults and adults with minor disabilities could be surveyed in future studies.

Implications for research and practice

The results of this study showed that the Chinese version of the EC scale is a useful tool for assessing the EC status of elderly Taiwanese adults. The revised Chinese EC questionnaire is a useful tool for doctors, dietitians, and social workers to evaluate elderly eating behaviours, especially in countries with Chinese immigrants. This study revealed that the majority of elderly Taiwanese adults with NEC were older elderly people, women, had elementary education, had no partner, and lived in rural areas. Nutrition educators should develop nutrition education programs specifically for the high-risk groups; for example, nutrition intervention videos and illustrations should be developed to increase awareness among older adults with elementary education. In addition, the internal regulation subscale should be modified to emphasize the eating behaviours among older Taiwanese. For example, the internal regulation subscale should convey cues of hunger and satiety as well as strategies for preventing overeating or fasting. The current nutrition education intervention strategies should be modified to suit elderly Taiwanese adults from various socio-demographic backgrounds; this can increase their EC and improve their overall quality of life.

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AUTHOR DISCLOSURES

The authors declare no conflicts of interest.

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