ผลของการให้ความรู้ด้านสุขภาพต่อความรอบรู้ทางสุขภาพและโภชนาการ และพฤติกรรมการรับประทานอาหารในวัยผู้ใหญ่ตอนปลายและผู้สูงอายุไทย
Effect of Health Education on Health and Nutrition Literacy and Food Consumption Behavior in Thai Late Older Adult and Elders

นิพนธ์ต้นฉบับ

ณัฐวรา จันทร์เอี่ยม[1], วานิด ดวงเดช[1], วิมลวรรณ เลิศวงศ์เผ่าพันธุ์[1], ศิวลาภ สุขไพบูลย์วัฒน์[2], อ้อทิพย์ ราษฎร์นิยม[2] และ วนิดา วิสุทธิพานิช[1]*

[1] คณะพยาบาลศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ อ.องครักษ์ จ.นครนายก 26120
[2] คณะเศรษฐศาสตร์และนโยบายสาธารณะ มหาวิทยาลัยศรีนครินทรวิโรฒ เขตวัฒนา กรุงเทพฯ 10110
* Corresponding author: vanida@g.swu.ac.th

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บทคัดย่อ

วัตถุประสงค์: เพื่อศึกษาผลของการให้ความรู้ต่อความรอบรู้ด้านสุขภาพและโภชนาการและพฤติกรรมการบริโภคอาหารในผู้ใหญ่ตอนปลายและผู้สูงอายุไทย **วิธีการศึกษา:** การวิจัยกึ่งทดลองแบบหนึ่งกลุ่ม แบบเปรียบเทียบก่อน-หลัง เลือกผู้ใหญ่ตอนปลายและผู้สูงอายุ 50 คนแบบเฉพาะเจาะจง ให้ความรู้ด้านโภชนาการและสุขภาพพร้อมกิจกรรมภายในเวลา 1 ชั่วโมง รวบรวมข้อมูลด้วยแบบสอบถามข้อมูลส่วนบุคคล แบบประเมินความรอบรู้ด้านสุขภาพและโภชนาการ และแบบประเมินพฤติกรรมการบริโภคอาหาร โดยประเมินก่อนเรียน และในอีก 4 สัปดาห์หลังเรียน เปรียบเทียบความแตกต่างของคะแนนความรอบรู้ด้านสุขภาพและโภชนาการ และคะแนนพฤติกรรมการบริโภคอาหารที่ก่อนและหลังการเรียนด้วยสถิติ paired t test **ผลการศึกษา:** คะแนนความรอบรู้ด้านสุขภาพและโภชนาการเพิ่มขึ้นจาก 6.30 คะแนน (เต็ม 7 คะแนน) เป็น 11.20 คะแนน อย่างมีนัยสำคัญทางสถิติ (*P*-value = 0.001) คะแนนพฤติกรรมการบริโภคอาหารดีขึ้นในด้านโปรตีน คาร์โบไฮเดรท ผักในกลุ่มที่มีน้ำมันหอมระเหย และผลไม้ ขนมและเครื่องดื่มรสหวานอย่างมีนัยสำคัญทางสถิติที่ระดับ 0.05 **สรุป:** การให้ความรู้ด้านสุขภาพที่เน้นโภชนาการช่วยเพิ่มความรอบรู้ด้านสุขภาพและโภชนาการและพฤติกรรมการบริโภคอาหารในผู้ใหญ่ตอนปลายและผู้สูงอายุไทย

คำสำคัญ: การให้ความรู้ทางสุขภาพ, ความรอบรู้สุขภาพและโภชนาการ, พฤติกรรมการบริโภคอาหาร, วัยผู้ใหญ่ตอนปลาย, ผู้สูงอายุไทย

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Original Article

Nattawara Chaneaim[1], Wanid Duangdech[1], Wimonwan Lertwongpaopun[1], Sivalap Sukpaiboonwat[2], Aotip Ratniyom[2] and Vanida Visuthipanich[1]*

[1] Faculty of Nursing, Srinakharinwirot University, Ongkharak, Nakhonnayok, 26120, Thailand
[2] School of Economics and Public Policy, Srinakharinwirot University, Wattana, Bangkok 10110, Thailand
* Corresponding author: vanida@g.swu.ac.th

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Abstract

Objective: To determine effects of health education on health and nutrition literacy and food consumption behavior in Thai late older adults and elders. **Method**: This quasi-experiment one-group pre-post research recruited 50 Thai late older adults and elders with a purposive sampling. The health education program was a one-hour with lecture and activities. Data were collected using questionnaires of demographic characteristics, health and nutrition literacy, and food consumption behavior before and 4 weeks after the program. Scores of health and nutrition literacy and food consumption behavior between before and after the program were compared using paired t test. **Results**: Scores of health and nutrition literacy significantly increased from 6.30 to 11.20 points (*P*-value = 0.001). Food consumption was significantly improved in protein, carbohydrate, vegetable with essential oil, and sweet fruit, dessert and soft drink at a significance level of 0.05. **Conclusion**: Health education improved health and nutrition literacy and food consumption behavior to in Thai late older adult and elders.

Keywords: health education, health nutrition and nutrition literacy, food consumption behaviour, Thai late older adult, Thai elders

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Introduction

Nowadays, more than 60% of Thai population is late adults and the elders. Thailand has entered the complete aging society.[1-3] One of the common problems in the elderly is nutrition-related health. Both physiologic and psychosocial changes affecting nutritional status of late adults and those over the age of 65, especially malnutrition, is a greater threat to this population than obesity. Previous studies show that risk factors leading to malnutrition include poor diet, limited income, isolation, chronic illnesses, poor knowledge, poor nutritional behavior, and physiologic changes.[1-4] World Health Organization stated that chronic disease etiology is related to poor food consumption behavior, especially heart disease, hypertension, hyperlipidemia, and diabetes.[5] The survey in Thailand revealed that among late adults and elders had poor consumption behaviors including consumption of sweets, salty foods, raw foods, caffeine, energy drink, and alcohol, and smoking.[6,7] More than 60% of the elders had inappropriate consumption behavior.[3,4] In addition to physiologic changes with age, poor economic stats and limited nutritional knowledge also contribute to food poor consumption behavior.[6-8]

Mirzaei and colleagues in 2020 showed that health education enhances health literacy of the elders and could lead to a better nutritional status.[9] They also found that knowledge, attitude and nutritional behavior are associated with health literacy significantly.[9] Various education methods help improve health literacy for individuals.[7-9] Promoting health literacy among the elders is a crucial intervention to further promote proper food consumption behavior, and ultimately a better health. Such intervention could be done at individuals, communities, and health care system levels.[5,8-11] Among Thai elders, their health literacy was at the functional and interactive level, but not critical level.[6] Their health literacy was associated with education, occupational history, visibility, and reading ability.[11] Health literacy is a personal capability to use cognitive, social, and interactive skill to access, understand, and evaluate health information from media and environment, and health services from providers. Health literacy leads the person to self-motivate to select ways for self-care, and management for a good health status.[7,12] Previous studies revealed that low health literacy was associated with a higher risk of death, hospitalization and higher care cost.[11-15] Information about proper food consumption provided by healthcare providers could promote nutritional health literacy among the elderly.

Nutritional literacy is an integration of food consumption knowledge and consumption behavior.[16] A study showed that the elderly with dementia and deteriorated cognitive function are more likely to have a low health literacy which could lead to a poor health promotion and poor self-management for their chronic illnesses.[17] A study revealed that education is associated with health literacy.[18] This present study aimed to test the effect of education on (1) health and nutrition literacy and (2) food consumption behavior.

For specific objectives, this study aimed to compare scores of health and nutrition literacy and food consumption behavior between before and after the health education program. In addition, this study aimed to test correlation between score of health and nutrition literacy and score of food consumption behavior after the program.

Methods

A quasi-experiment one-group pre-post research design was used to investigate the effects of health education activity on (1) health and nutrition health literacy and (2) food consumption behavior among Thai late older adults and elders. The experiment was conducted on March 15, 2021, the follow-up for post-test was one month later.

Sample size was based on paired t test. With an effect size of 0.5[5,23], a type I error of 1% (or α = 0.01), a power of 80%, a sample size of 43 participants was needed. To compensate for a 10% attrition rate, a total of 48 participants were needed. We recruited 50 participants. The sample size calculation using the G Power formulation.

Study population and sample

Study population was Thais aged 45 to 79 years old who resided in Pakplee district, Nakhonnayok province, Thailand. The sample was those who met the inclusion criteria and were willing to participate in the study. Participants were recruited through a purposive sampling technique. To be eligible, they had to be 45 years old or older, ambulatory, with intact cognitive function, and able to understand Thai language.

Research instruments

The instruments consisted of (1) health education program, (2) questionnaires consisting of demographic characteristics questionnaire data, health and nutritional literacy questionnaire, and food consumption behavior questionnaire.

For the health education program, it was developed by the researchers as guided by literature.[5,23] The program was a comprehensive 60-minute course. The content consisted of health education on nutrition to delay aging, food for the elderly, food for illnesses specific for the elderly, type of foods, food preparations, how to choose foods suitable for age and illnesses, and how to self-evaluate nutritional status. The content was delivered through lecture, group games and quiz.

The questionnaire on **demographic and health status** collected information of age, gender, occupation, perceived general health status (poor, moderate, and good), body mass index (BMI), and underlying diseases/health problems. **Health and nutrition literacy** was assessed by a questionnaire developed by the researchers as guided by previous research.[2,8-10,17,19-20)] It was a self-administered 12-questions questionnaire consisting of two parts, namely health literacy (5 questions) and nutrition literacy (7 questions). For 5 questions of health literacy, it assessed how much the participant know about the access, evaluation, use, and

dissemination of the information from the media. For 7 questions on nutrition literacy, it assessed how the participant know about foods for illnesses specific to the elderly, type of food, food preparations, food suitable for age and illnesses, and self-evaluation on nutrition. The response format was a "yes" or "no" answer. A score of 1 point was given for a correct answer and 0 points for an incorrect one. A possible total score of 12 points for the whole questionnaire and 5 and 7 points for health literacy and nutrition literacy, respectively. Level of literacy was categorized as high, moderate, and low with the total score of 9 or higher, 4 – 8, and 3 or lower, respectively.

Food consumption behavior was assessed by a questionnaire developed by the researchers as guided by literature.[1,2,8-10,17,19,20] It was a 25-items self-administered questionnaire. The 25 questions assessed consumption behavior of food with protein, carbohydrate, vegetables, fruits, fat/oil, and sweet foods and drinks (8, 5, 3, 2, 2, and 5 questions, respectively). The response scale was 3-consuming regularly or more than 4 times per week, 2-consuming occasionally or 1 to 4 times per week, and 1- rarely consuming or 1 time in two weeks. Scores of foods that were inappropriate for the elderly, for example, noodle and oil/fat, were sweet foods/dessert/drinks, were reversed when summing the scores for each type of food. The possible total scores for overall questionnaire and each type of food were standardized to the range of 1 – 3 points. The whole questionnaire took about 10 minutes to complete.

Instrument quality assurance

The questionnaire was tested by three experts in nursing and nutrition. They were asked to rate the content validity using the item objective congruence index (IOC). The content validity was acceptable with an IOC of at least 0.80 for each of all items. For internal consistency reliability, 30 individuals with characteristics comparable to the participants were asked to complete the questionnaire. Internal consistency reliability was acceptable with Cronbach's alpha coefficients of 0.81 and 0.88 for health and nutrition literacy questionnaire and food consumption behavior questionnaire, respectively.[21]

Study procedure and data collection

Potential participants were invited to a one-hour program at a hospital. They were screened for eligibility. After all information about voluntary nature of the study was provided to those eligible, written informed consent was obtained. Before the class, the participants were asked to complete the questionnaires of demographic and health status characteristics, health and nutrition literacy, and food consumption behavior. The lecture and quiz part of the program was conducted by one researcher, and group activities were led by five trained assistants. The post-program follow-up was held at the same hospital one month later. The participants were asked complete the questionnaires of health and nutrition literacy, and food consumption behavior. Filled questionnaires were corrected or completed in any missing or incomplete answers were found.

Participant protection

This study was approved by the Ethical Committee, Srinakharinwirot University, Thailand, and SWUEC-136/2563E. Participants were provided with the voluntary nature of the study. They could withdraw from the study at any time without consequences. Results of the study were presented as a summary not individual participant's data.

Statistical data analysis

Demographic and health status characteristics, health and nutrition literacy, and food consumption behavior were presented as frequency with percentage and mean with standard deviation (SD). Mean scores of health and nutrition literacy and food consumption behavior between before and after the health education program were compared using paired t test. Correlation between score of health and nutrition literacy and score of food consumption behavior after the program was tested Pearson's product moment correlation coefficient. All statistical significance was set at a type I error of 5% (or P-value < 0.05). All statistical analyses were performed using SPSS software version 20.

Results

Of the 50 participants, most were female 98.2% (Table 1). The majority were in their 60 – 69 years old (young elderly) (40.0%) with the mean age of 63.0 years old. Almost two-thirds were married (64.0%) and moderately healthy (64.0%). The majority were housewife and farmers/agriculturist (46.0% and 40.0%, respectively). In terms of BMI, the majority were normal, overweight, and obese (30.0%, 26.0%, and 30.0%, respectively) based on the standard established by the

Department of Health (18.5 kg/m^2 ≤ BMI < 22.9 kg/m^2).[20] More than half perceived their health status as moderately healthy (60.7%), and had underlying diseases or health problems (56.0%), with gout, hypertension, and peptic ulcer as the most frequently reported problems (21.4%, 14.3%, and 10.7%, respectively) (Table 1).

Table 1 Demographic and health status characteristics of the participants (N = 50).

Characteristics	N	%
1. Gender		
Female	49	98.0
Male	1	2.0
Age (years), mean = 63.0		
46 - 59 (late adult)	16	32.0
60 - 69 (young elderly)	20	40.0
70 - 79 (middle elderly)	14	28.0
Marital status		
Singer	8	16.0
Married	32	64.0
Divorce/Separate	10	20.0
Occupation		
Housewife	23	46.0
Farmer / agriculturist	20	40.0
Not working	2	4.0
Others	5	10.0
Perceived health status		
Moderate	32	64.0
Good	18	36.0
BMI (Kg/m^2)		
Underweight (< 18.5)	3	6.0
Normal (18.6 - 22.9)	15	30.0
Overweight (23.0 - 24.9)	13	26.0
Obese (25.0 - 29.9)	15	30.0
Very obese (>30.0)	4	8.0
Underlining disease/health problem (yes/no)		
No	22	44.0
Yes	28	56.0
Hypertension	4	14.3
Gout	6	21.4
Peptic ulcer	3	10.7
Cardiovascular disease	1	3.6
Respiratory disease	1	3.6
Cataract	1	3.6
Benign prostatic hypertrophy	1	3.6

Most participants had a low health and nutrition literacy before the education (44.0%), followed by a moderate level (36.0%) (Table 2). One month after the education, the improvement was seen as more participants had moderate literacy (44.0%) and high literacy (40.0%). The mean score of health and nutrition literacy after the education (11.20 points) was significantly higher than that before the program (6.30 points) (*P*-value = 0.001).

Table 2 Health and nutrition literacy (N = 50).

Literacy level*	Before education (N = 50)		After education (N = 50)	
	N	%	N	%
Low (≤ 3 points)	22	44.0	8	16.0
Moderate (4 – 8 points)	18	36.0	22	44.0
High (≥ 9)	10	20.0	20	40.0
Mean ± SD	6.30 ± 1.28		11.20 ± 0.80	
	t = 8.25, df = 49, *P*-value = 0.001			

* Possible total score of 0 – 12 points.

The food consumption behavior relatively changed after the education (Table 3). The participants had more protein from fish, dairy product, and egg. They had more brown rice or unrefined rice, vegetables especially those with essential oil such as turmeric, pepper, black pepper, galanga, lemongrass. The post-education follow-up interview showed that these older adults and elders had more of these fragrant vegetables helped boost their appetite. They were able to eat more rice and riceberry rice by adding these unrefined rice grains to the plain rice grains so the texture is not too hard to chew. The participants also had less dessert, sweet fruit, soft drink, 3-in-1 coffee and tea, and bakery after the education class. However, a certain proportion of participants still had similar consumption behavior (Table 3). The still had Thai desserts after lunch or as afternoon break since these foods made them feel full. In addition, since Thai people regularly have these desserts, it was difficult to reduce the consumption of them.

Statistically speaking, once mean score of each of food type was considered, the consumption behavior was improved as shown by significantly increased mean scores of protein (1.81 to 2.20 points, *P*-value = 0.035), vegetable (2.80 to 2.95 points, *P*-value = 0.040), and good carbohydrate (2.53 to 2.60 points, *P*-value = 0.046), and significantly decreased scores of sweet fruits (2.88 to 2.24 points, *P*-value = 0.022) and deserts and drinks (2.85 to 2.04 points, *P*-value = 0.012). The decreased score of fat/oil consumption was found with no statistical significance (2.85 to 2.80 points, *P*-value = 0.051) (Table 3).

Finally, score of health and nutrition literacy was significantly, positively correlated with score of overall food consumption behavior (Pearson's correlation coefficient of 0.251, *P*-value = 0.034).

Table 3 Food consumption behavior (N = 50).

Kind of food consumed	Frequency of food consumption, n (%)*					
	Before education (N = 50)			After education (N = 50)		
	Regularly	Occasionally	Rarely	Regularly	Occasionally	Rarely
Protein						
Duck or chicken	10 (20.0)	23 (46.0)	17 (34.0)	10 (20.0)	26 (52.0)	14 (28.0)
Pork or beef	8 (16.0)	24 (48.0)	18 (36.0)	10 (20.0)	24 (48.0)	16 (32.0)
Fish	30 (60.0)	10 (20.0)	10 (20.0)	40 (80.0)	8 (16.0)	2 (4.0)
Seafood	5 (10.0)	30 (60.0)	15 (30.0)	5 (10.0)	30 (60.0)	15 (30.0)
Egg	28 (46.0)	20 (40.0)	2 (4.0)	30 (60.0)	20 (40.0)	0 (0.0)
Milk or dairy products	20 (40.0)	12 (24.0)	18 (36.0)	20 (40.0)	20 (40.0)	10 (20.0)
Bean or nuts	15 (30.0)	22 (44.0)	13 (26.0)	15 (30.0)	24 (48.0)	11 (22.0)
Mean ± SD (points)		1.84 ± 0.38			2.20 ± 0.27	
			t = 2.009, df = 49, *P*-value = 0.035†			
Carbohydrate						
Rice or sticky rice	30 (60.0)	15 (30.0)	5 (10.0)	30 (60.0)	15 (30.0)	5 (10.0)
Noodle	12 (24.0)	38 (76.0)	0 (0.0)	10 (20.0)	40 (80.0)	0 (0.0)
Brown rice or unrefined rice	22 (44.0)	13 (26.0)	15 (30.0)	32 (64.0)	18 (36.0)	0 (0.0)
Taro or potato	2 (4.0)	29 (58.0)	19 (38.0)	4 (8.0)	28 (56.0)	18 (36.0)
Mean ± SD (points)		2.53 ± 0.35			2.60 ± 0.31	
			t = 2.008, df = 49, *P*-value = 0.046†			
Vegetable						
Green vegetable	38 (76.0)	10 (20.0)	2 (4.0)	42 (84.0)	8 (16.0)	0 (0.0)
Orange, red, purple vegetable	20 (40.0)	30 (60.0)	0 (0.0)	22 (44.0)	28 (56.0)	0 (0.0)
Turmeric, pepper, black pepper, or galanga	18 (36.0)	28 (56.0)	4 (8.0)	30 (60.0)	20 (40.0)	0 (0.0)
Mean ± SD (points)		2.80 ± 0.09			2.95 ± 0.07	
			t = 2.010, df = 49, *P*-value = 0.040†			
Sweet fruit						
Sweet fruits	11 (22.0)	28 (56.0)	11 (22.0)	8 (16.0)	34 (68.0)	8 (16.0)
Less sweet fruits	25 (50.0)	10 (20.0)	15 (30.0)	30 (60.0)	15 (30.0)	5 (10.0)
Mean ± SD (points)		2.88 ± 0.10			2.24 ± 0.23	
			t = 2.009, df = 49, *P*-value = 0.022†			
Fat/oil						
Vegetable oil, coconut milk, or soybean oil	29 (58.0)	14 (28.0)	7 (14.0)	28 (56.0)	16 (32.0)	6 (12.0)
Lard oil	5 (10.0)	16 (32.0)	29 (58.0)	5 (10.0)	18 (36.0)	27 (54.0)
Mean ± SD (points)		2.85 ± 0.21			2.80 ± 0.25	
			t = 2.009, df = 49, *P*-value = 0.051			
Dessert and drinks						
Coffee and tea (3-in-1 instant type)	26 (52.0)	8 (16.0)	16 (32.0)	10 (20.0)	20 (40.0)	20 (40.0)
Soft drink	13 (26.0)	22 (44.0)	15 (30.0)	8 (16.0)	27 (54.0)	15 (30.0)
Thai desserts	10 (20.0)	30 (60.0)	10 (20.0)	8 (16.0)	32 (64.0)	10 (20.0)
Bakery	4 (8.0)	32 (64.0)	14 (28.0)	2 (4.0)	33 (66.0)	15 (30.0)
Ice cream	14 (28.0)	26 (52.0)	10 (20.0)	10 (20.0)	28 (56.0)	12 (24.0)
Mean ± SD (points)		2.85 ± 0.45			2.04 ± 0.54	
			t = 2.009, df = 49, *P*-value = 0.012			

* Frequency of food consumption: 3 = consuming regularly or more than 4 times per week, 2 = consuming occasionally or 1 to 4 times per week, and 1 = rarely consuming or 1 time in two weeks.

† Significant at a *P*-value < 0.05.

Discussions and Conclusion

Results from this study show that Thai late adults and elders had poor to moderate level of the health and nutrition literacy. The finding is consistent with previous studies showing that Thai elderly had limited health literacy and the strategies to promote the literacy needs to be improved.[5,23] After the education program, more participants have improved to moderate to high level of literacy. This is consistent with previous studies suggesting that education program, both short and long programs for late adults and elders, especially in those with lower income, resulted in an increased knowledge and improved consumption behavior.[12,16,22,23] This study also showed that late adults and elders had changed their consumption behavior as they significantly increased their consumption of good food including protein (i.e., dairy product, nut, fish, and meat), good carbohydrate (i.e., fiber from brown rice and unrefined rice), and vegetable; while significantly decreased their consumption of harmful food as dessert and sweet fruits. These changes are consistent with previous studies revealing that preference on foods is affected by beliefs and attitudes which are positively correlated with health knowledge.[24,25]

Our study found that the consumption of fat/oil decreased slightly with no statistical significance (P-value = 0.051). This could be because it is the life-long habit that is difficult to change. Since food with fat or oil is usually tasty for most people, it could be difficult to change.[26] Furthermore, other factors such as family income, socioeconomic status, education, beliefs, experience, physical function, and health are associated with the consumption patterns in older people.[16,26-29]

Our study also found that health and nutrition literacy was positively associated with good food consumption behavior among late older adults and elders. The change in food consumption behavior among the Thai elders was associated with health status factor such as underlying illnesses and enforcing factors of access to and provision of health information relating to food and nutrition, advice and monitoring on food consumption.[25,30-32] Adequate enforcement of health literacy among late older adults and elders is a crucial strategy in modifying these elders health behavior. These strategies could be conducted through health education, healthcare provider provision, and healthcare system.[9,16,33] Health behavior in self-care in general health and nutritional health in their late adult life. Such healthy stage of life could affect their health in their elderly life for non-communicable diseases which could further affect their quality of life in their elderly life.[28,34-36]

Regarding implications, the health education program for nutrition health could be implemented in healthcare practice. The program should be promoted and supported financially at all healthcare system levels. However, since the study was not a control-group study, the application should be cautious.

This study had certain limitations. It was conducted with a relatively small sample size with a medium effect size estimated. Future studies could employ a larger sample size for more reliable findings. The follow-up was only one month which might not be suitable to prove sustainable effect of the education program. Since this study was a one-group pre-post experimental research, intrinsic bias was inevitable. Future studies with a comparison group should be conducted. Lastly, the questionnaires of health and nutrition literacy and food consumption behavior were used at the first time. Future studies could further improve psychometric properties of the two tools.

In conclusion, one-day health education program emphasizing nutrition and consumption behavior resulted in a better health and nutrition literacy and food consumption behavior.

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Consideration of conflicting interests

The authors declared no potential conflicts of interest with respect to the author and/or publication of this article.

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