Development and validation of the food involvement inventory (FII) featuring the attitudinal constructs

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Abstract Food involvement is one of the personality traits that influences the food cognition and behavior of consumers. Given the irrelevance of previous food involvement scales such as measuring lifestyle diligence and a food culture, this study aimed to develop the food involvement inventory (FII) designed specifically for foods and current consumers. This study focused on identifying the factors/constructs of the FII that would best represent and explain food involvement through item generation, administration, and validation. The collected items from involvement-related scales and expert discussions were administrated based on the evidence of construct and content. Validation of the FII based on the exploratory factor analysis identified four attitudinal components as constructs (affective, cognitive, behavioral-purchase, and behavioral-cooking) within the final 25 items. These four constructs constituted structural models for the FII, and the models were shown to be acceptable in the confirmatory factor analysis.

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Introduction

Consumer tests as methods of the consumer-led product development (De Pelsmaeker et al., 2015) has become more important since it is the only way to reveal the complex characteristics of the food product, recognized by the actual consumers. Given that how consumers recognize a food product in a consumer test can vary with their personality, the psychological characteristic of consumers (Robino et al., 2016) needs to be defined for use as a criterion of consumer classification and to understand the result of consumer test according to individual differences. For this, personality traits of consumers relating to the cognition of food product can be determined from their behaviors when they select, purchase, or consume a food product.

A central theme in consumer behavior research is that consumer involvement with a product is an important personal variable influencing consumer choices in the market, since product involvement mediates the interaction between the consumer and the product (Laaksonen, 1994). Especially in the current society, consumer involvement can affect consumer behavior more than before.

Consumers' access to the product information has not only increased ever than before, but it also became active due to advances in social media and information technology. Thus, classification of consumers by their involvement can help us to understand and predict current consumer behavior.

Generally, involvement can be defined as the relevance, importance, interest, or concern about a specific target recognized by individuals in certain circumstances (Zaichkowsky, 1986), having psychological nature (Slama and Tashchian, 1985). Involvement has also been explained as attention or activeness in reacting to and processing marketing information (Kotler and Keller, 2009) and as the number of connections between the stimulus and the personal references (Krugman, 1965). And, it is quite clear that the involvement of consumers with a food product greatly influences their attitude toward that food, and further affects their cognition and evaluations of it, both directly and indirectly as shown in the previous study (Ares et al., 2010). Therefore, Food involvement might be recognized as an appropriate criterion for discriminating consumer groups and understanding their food perceptions. Moreover, a need for research into the involvement of consumers in foods has emerged gradually in accordance with increase in consumption levels and diversification and advancement of the food industries.

The food involvement has been measured by applying general involvement scales (Laurent and Kapferer, 1985; Mittal, 1989; Slama and Tashchian, 1985; Zaichkowsky, 1985) in a nonfood-specific manner, which inevitably means that some of the items in such scales can be inappropriate to apply to food products. There are previous studies on the development of inventory for measuring one's involvement for food. Two of the studies have developed a involvement inventory for specific foods: one for fish by asking its symbolism and value in their life (Juhl and Poulsen, 2000) and the other for wine by developing expertise, enjoyment, and symbolic constructs (Brown et al., 2007). However, these studies have limitation in measuring consumer food involvement in a generic sense. On the other hand, Bell and Marshall (2003) developed an inventory that can measure consumer food involvement in general. However, the inventory needed to be reviewed for the exclusion of items about lifestyle diligence and particular-food culture (Lee et al., 2018) and for the definition of factors/constructs of generic food involvement. Therefore, this study aimed to develop a food involvement inventory (FII) for generic food and to define the constructs of the FII reflecting the lifestyle of contemporary consumers.

Materials and methods

The food involvement inventory (FII) was developed sequentially along the three studies: item generation (Study 1), item selection (Study 2), and validation and finalization (Study 3).

Study 1: food involvement item generation

Collecting items

For the first step to develop the FII, the potential items for the FII were adopted from the previous involvement studies (Bell and Marshall, 2003; Espejel et al., 2009; Higie and Feick, 1989; Hollebeek et al., 2007; Jain and Srinivasan, 1990; Kapferer and Laurent, 1985; Laurent and Kapferer, 1985; McQuarrie and Munson, 1987; Mittal, 1989; Pieniak et al., 2008; Slama and Tashchian, 1985; Traylor and Joseph, 1984; Zaichkowsky, 1985). Considering the theoretical and phenomenal definitions of involvement, some items were also collected from the scales which measure the behaviors that seemed to be related to involvement (Baumgartner and Steenkamp, 1994; Baumgartner and Steenkamp, 1996; Muncy, 1996; O'Brien and Toms, 2010; Witmer and Singer, 1998).

Developing items

In order to develop new items that reflect the behavior of food consumers in the current environment, six multidisciplinary experts in the field of sensory and/or food science (four Ph.D. and two Ph.D. candidates from academia or industry) participated in a series of discussions. And, they edited the developed items in order to ensure relevancy, consistency, and efficiency of the inventory by removing or modifying items with irrelevant or redundant contents. All items then were revised into sentence form written in first-person narrative rather than in word form, in consideration of the descriptions that consumers used for foods, which infer their attitudes and behaviors toward foods. This editing process has been performed repeatedly, considering validity evidence based on the content.

Study 2: food involvement item selection

Prescreening of items

Two hundred and six assessors (61 males, 145 females; age range=20–49 years) were recruited to select more appropriate items by evaluating the items using online surveys (SurveyMonkey, San Mateo, CA, USA). They were asked to rate how much they agree or disagree with each item on

a nine point agree/disagree attitude scale. The scale was modified from a traditional Likert scale by providing additional options between the labels considering that consumers are normally indecisive about selecting between two neighboring labels on a relatively short category scale. On the scale, the odd numbers were only labeled (as "strongly disagree," "disagree," "neither agree nor disagree," "agree," and "strongly agree" from one to nine, respectively).

Analysis of dimensionality

An exploratory factor analysis (EFA) was performed to investigate the dimensional structure of the inventory and to select items for the inventory. In EFA, principal component as the extraction method and varimax (orthogonal) as the rotation method were used, which revealed dimensions (constructs or factors) by grouping interrelated items into several sets. In order to determine whether the distribution of values was suitable for factor analysis, the Kaiser–Meyer–Olkin (KMO) was measured, and a cutoff of >0.60 was applied. Bartlett's test of sphericity (BTS) was also applied to check homogeneity of variance across normal populations. Only factors having eigenvalues greater than one were considered for inclusion in the dimensions. In the case of the EFA for establishing the optimal structure of the inventory, factor analysis was repeatedly performed by changing the number of common factors in order to determine how many factors should be included in the structure of the inventory.

Analysis of reliability

Cronbach's alpha was calculated to assess the internal consistency by measuring the correlations among items in the inventory. The corrected item-total correlations (CITCs) were also computed to test item discrimination to ensure that the inventory did not include irrelevant items. All analyses were performed using the statistics package, PASW Statistics 18.0 (SPSS Inc., Chicago, IL, USA).

Analysis of content validity

In order to ensure the content adequacy of the included items, items were modified or deleted during validation process. In the scope of the involvement concept, the validation was performed based on evidence of content referring to theme, wording, and format of item by seven experts in the fields such as food science, sensory science, and statistics (four Ph.D. and three Ph.D. candidates). The expert group judged whether potential items were appropriate parameters for determining the level of food involvement of the consumers. In order to build a well-

delivered and user-friendly inventory, 30 undergraduate and graduate students were asked to identify ambiguous or redundant items considering the definition of involvement.

Study 3: food involvement item validation and finalization

Analysis of structure

The administrated items in Study 2 were evaluated by 516 assessors (199 males, 317 females; age range$=20$–49 years). An EFA was repeatedly performed to identify constructs underlying sets of evaluated items while referencing the constructs proposed in Study 2. For the inventory to have discriminant validity, only items satisfying the criterion of a factor loading exceeding 0.50 onto a single relevant factor were retained in the list. Internal consistency was also confirmed. The evaluation and analysis methods were the same as those performed in Study 2. The dimensionality was analyzed further using the GGobi graphical software system (The GGobi Foundation, Inc, Ames, IA, USA) to explore and visualize high-dimension data (more than three dimensions), which yielded dynamic and interactive graphics in two-dimensional tour mode. To capture the informative linear projections elucidating the inventory structure, the projection pursuit indices (the optimization of predetermined criterion function) were used: linear discriminant analysis (for a view representing a difference among data groups), holes (for a view with a large hole in the center of the view), and central mass (for a view showing the most concentrated data center).

Confirmation of constructs

In order to name the constructs obtained from the EFA, extensive literature review was conducted, providing the rationale for labeling the constructs. To test the relationship between the items and their underlying latent constructs and confirm the construct structure of the inventory, confirmatory factor analyses (CFA) were performed as a structural equation modeling method using the SAS® procedure PROC CALIS (The SAS 9.4 system, SAS Institute, Cary, NC, USA). The adequacy of the model fit was determined using the following six indices: Chi square, Chi square/degrees of freedom, root-mean-square error of approximation (RMSEA), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), and standardized root-mean-square residual (SRMR).

Results and discussion

Study 1: food involvement item generation

The literature review and experts' discussions yielded 344 initial items in total. Considering possible correlations with food involvement, 175 items were adopted from previously developed involvement scales and their revised versions. In terms of the involvement-related behavior of consumers, 38 items were collected from other behavioral scales which measure change seeking, exploratory buying, brand parity, and test engagement. In consideration of the food-related attitudes and lifestyles of contemporary consumers that are possibly correlated with involvement, new contents were developed into 131 items. These were based on variables or factors such as food preferences, food purchases, food safety perceptions, cognitive dissonance after food choice, and other food-related behavior variables, resulting from the literature review and the experts' discussion.

In the first attempt to construct the inventory, the expert group selected the representative items among the items of the same or similar meaning and eliminated items that are irrelevant to food involvement. Those selection and elimination resulted in the remaining 108 items. These items were rephrased into simple and straightforward statements, and finally were included in the preliminary inventory.

Study 2: food involvement item selection

A factor analysis in the EFA identified that 108 items were too many for determining the dimensionality of the preliminary inventory. Using a variance-extracted method (with a criterion of at least 50% of the variance explained), the EFA was repeatedly performed to reduce the number of extracted factors. And, the 108 items were reviewed to reduce the number of constructing factors.

20 items were excluded after analyzing the CITCs, with values > 0.3 considered acceptable. The items excluded in this stage were mainly related to food neophobia, brand loyalty, price acceptance, negative statements, and purchase risk. Accordingly, another nine items related to the same themes were also dropped, and 25 items were further eliminated by assessing the content validity, which considered items with a potentiality of being interpreted in multiple ways.

The EFA on the remaining 54 items yielded 10 latent factors having eigenvalues greater than one. The results of EFAs performed with changing the number of factors from 10 to three revealed that five factors explaining the underlying dimensions of the inventory is suitable for the number of common factors, showing the correspondence of the factors and the respective items. Reviewing this result,

the expert group indicated that 12 of these 54 items should be deleted since they might be misinterpreted due to their low relevance to food involvement, have weak correlations with the respective factor, or exhibit redundancy with other items. The expert group also suggested exclusion of one item with a low factor loading (0.28) based on the EFA results. In addition, the results of ambiguity and redundancy testing identified another 12 items, which were also excluded.

The dimensionality of the inventory with the remaining 29 items was identified by EFA (Table 1). All items exceeded the cutoff value for an acceptable KMO statistic (with an overall Cronbach's alpha coefficient of 0.94) and were significant ($p < 0.01$) in BTS, which showed that the collected data were suitable for the factor analysis having the factorability. The EFA yielded five dimensional latent factors that together accounted for 63.32% of the total variance. The item loadings ranged from 0.44 to 0.82, exceeding the cutoff value of 0.40. In addition, the overall Cronbach's alpha coefficient was 0.95, indicating a high degree of internal consistency. All items exhibited item discrimination, based on CITCs exceeding 0.40 (ranging from 0.40 to 0.74).

According to the factor loading of each item, there were five groups for 29 items as shown in Table 1. Candidates for the constructs/factors were labeled based on the contents of items allocated to each factor. The constructs were about the attitudes or behaviors related to efforts for cooking (relevant to food lifestyle: F1), affection/emotion (relevant to interest and importance in foods: F2), consumer decision-making process (relevant to choice and purchase of foods: F3), cognition (relevant to knowledge and informative about foods: F4), and desire for learning (relevant to direct and indirect experience about foods: F5); these constructs accounted for 15.62, 14.98, 11.56, 11.20, and 9.95% of the total variance, respectively. Further item editing was performed before proceeding to the next step, comprising modifying item contents to make them more specific (e.g. item 65 and 92, "choosing" was replaced with "purchasing") or general (e.g. item 25, "for meetings" was deleted), and replacing emotional issues with behavioral issues (e.g. item 83, "enjoy preparing" was modified to "often prepare") for the objective measurement.

Study 3: food involvement item validation and finalization

The EFA (KMO=0.95, $p < 0.01$ in BTS) identified five underlying latent factors in the revised 29 items (Model 1, not shown). Even though the dimensional structure of the revised 29 items had also five latent factors and had not been significantly different from Study 2, there were some alterations in the correlations between items (observed

Table 1 Factor loadings from exploratory factor analysis[a] of the 29 items

ID	Items	F1[b]	F2	F3	F4	F5
55	I enjoy cooking	**.82**	.13	.19	.15	.15
29	After eating delicious food elsewhere, I make it myself	**.81**	.09	.18	.02	.22
66	I have knowledge about food and cooking	**.70**	.21	.10	.31	.18
20	I am interested in food-related information and cooking tips	**.63**	.15	.25	.17	.42
83	I enjoy preparing food and eating with people	**.63**	.37	.00	.24	.05
80	I care about buying good cooking ingredients	**.60**	.07	.43	.32	.23
25	I enjoy buying and preparing food for meetings	**.59**	.39	.27	.22	.08
7	What I eat is a big concern for me	.18	**.79**	.05	.16	.18
62	I am interested in food	.27	**.69**	.18	.34	.21
22	Food is an important part of my life	.13	**.66**	.28	.18	.25
44	I often think about what I ate or am going to eat	.13	**.62**	.23	.16	.31
1	Buying food gives me pleasure	.25	**.62**	.27	.13	−.03
5	I enjoy talking about food	.06	**.61**	.22	.01	.44
63	I invest time in buying cheap and high-quality food	.24	.27	**.70**	−.06	−.06
65	I look for relevant information before choosing food	.12	.25	**.64**	.32	.24
47	I look at several retailers (on-line and off-line) before purchasing food	.24	.28	**.62**	.07	.15
92	I compare different options before choosing food	−.03	.14	**.60**	.28	.35
30	I consider various things when choosing food	.18	.32	**.57**	.22	.19
76	I check the information on package before selecting food	.32	−.25	**.55**	.29	.11
45	I know of particular brands and stores that I consider to be sources of good food	.09	.14	.10	**.75**	.26
56	I have certain requirements or a favorite brand for each food	.28	.06	.25	**.73**	.04
57	I can recommend certain food items to other people	.20	.46	−.01	**.64**	.25
74	When I choose food, I am confident in my choice	.30	.26	.25	**.56**	.02
61	Generally I can specify the reason why I chose a particular food	.26	.35	.29	**.53**	.15
34	I enjoy food-related TV programs	.30	.18	.05	.09	**.71**
79	I enjoy food-related information on SNS (Internet social network) and blogs (personal Internet journal)	.13	.19	.31	.15	**.69**
82	I am interested in stories about food	.33	.40	.18	.26	**.57**
23	I enjoy evaluating the food I eat	.30	.40	.07	.34	**.47**
33	I enjoy the process of selecting food	.40	.28	.19	.23	**.44**

The loadings for the main factor are highlighted in bold

[a] N=206

[b] F1–5, factor one to five: F1, relevant to food lifestyle; F2, relevant to interest and importance in foods; F3, relevant to choice and purchase of foods; F4, relevant to knowledge and informative about foods; F5, relevant to direct and indirect experience about foods. The exploratory factor analysis was performed using the method of principal component extraction and varimax rotation

variables) and factors (unobserved variables). In the new EFA, eight items (items 33, 34, 45, 56, 76, 79, 80, and 82) were grouped into different factors. The EFA results also indicated that the two purchase-related items (items 80 and 63) were in the same factor. Thus, item 80 which was less relevant to the factor was excluded in consideration of the relevance between factors and items. The following EFA on the remaining 28 items for further judgment to include/exclude items yielded 4 underlying latent factors (KMO= 0.95, p<0.01 in BTS, Model 2, not shown). And, three items (items 23, 45, and 56, with factor loadings of 0.43, 0.43, and 0.26, respectively) were eliminated from the list,

since they were not satisfied the criterion of a factor loading exceeding 0.50.

In terms of reliability, the remaining 25 items exhibited internal consistency (with an overall Cronbach's alpha coefficient of 0.94) and item discrimination (with CITCs greater than 0.40; they ranged from 0.44 to 0.77). Applying the EFA to the 25 items resulted in four latent factors (KMO=0.95, p<0.01 in BTS) in the inventory that accounted for 61.97% of the total variance in food involvement (Model 3, Table 2). Taking together the best views ((A), (B), and (C) of Fig. 1) visualized by GGobi indicated that the inclusion of four factors was appropriate

Table 2 Factor loadings from exploratory factor analysis[a] of the revised final 25 items (Model 3)

ID	Items[b]	F1[c]	F2	F3	F4
29	After eating delicious food elsewhere, I make it myself	**.82**	.10	.17	.14
20	I am interested in recipes	**.77**	.20	.27	.18
83	I often prepare food and share with people	**.73**	.08	.10	.35
55	I like cooking	**.72**	.12	.21	.27
25	I enjoy buying and preparing food	**.69**	.30	.25	.25
79	I enjoy food-related information on SNS and blogs	**.67**	.35	.25	−.12
34	I enjoy food-related TV programs	**.59**	.37	.13	−.27
66	I have knowledge about food and cooking	**.54**	.21	.31	.38
1	Food gives me pleasure	.17	**.79**	.08	.14
22	Food is an important part of my life	.10	**.78**	.27	.07
7	I am very concerned about what I eat	.16	**.75**	.19	.23
62	I am interested in food	.26	**.70**	.36	.19
44	I often think about what I ate or am going to eat	.25	**.66**	.24	.12
5	I enjoy talking about food	.33	**.60**	.24	.27
92	I compare different options before purchasing food	.11	.26	**.72**	.12
30	I consider many things when I buy food	.22	.22	**.70**	.23
65	I look for relevant information before purchasing food	.23	.11	**.67**	.09
76	When I buy food, I check the information on the package	.23	−.02	**.64**	.16
63	I try to buy satisfactory food	.19	.42	**.63**	.18
47	I look for several retailers (on-line and off-line) before purchasing food	.26	.18	**.62**	−.06
82	I focus on information about food	.40	.46	**.55**	.08
33	I spend much time and effort for choosing food	.01	.28	**.54**	.10
74	When I choose food, I am confident in my choice	.26	.17	.20	**.70**
57	I can recommend certain food items to others	.21	.36	.13	**.66**
61	Generally I can specify the reason why I chose a particular food	.14	.26	.47	**.51**

The loadings for the main factor are highlighted in bold

[a] $N = 516$

[b] Item 23, 45, 56, and 80 were excluded from Table 1 for Model 3. Exclude item 29, 20, 83, 55, 25, 79, 34, and 66 for Model 4

[c] F1–4, factor one to four: F1, behavioral-cooking; F2, affective; F3, behavioral-purchase; F4, cognitive). The exploratory factor analysis was performed using the method of principal component extraction and varimax rotation

for detecting discriminable clusters of the items in multi-dimensional space.

The four groups of items (corresponding to the four factors) were designated quite consistently by the sequentially performed EFAs in this study, which supports that the following four factors were quite robust constructs for the FII: efforts for cooking, affection/emotion, consumer decision-making process, and cognition. These factors accounted for 18.96, 17.63, 17.07, and 8.32% of the total variance, respectively.

Based on the contents of the items in each factor and the cumulative data from previous studies of involvement and consumer behavior, attitudinal components were identified as the latent constructs (Fig. 2). Attitude comprises three components: affective, cognitive, and behavioral (Pratkanis et al., 2014; Schiffman and Kanuk, 2010). Accordingly, the four factors (F1–4) as constructs were labeled with these

attitudes toward food: behavioral attitude in cooking (behavioral-cooking: BC), affective attitude (affective: AF), behavioral attitude in purchase (behavioral-purchase: BP), and cognitive attitude (cognitive: CG), respectively. The additional EFA applied to the 17 items (Model 4, not shown) excluding the eight items belonging to BC showed that the internal structure of Model 4 coincided with that of the 17 items in the previous EFA of all 25 items, further supporting the applicability of the inventory.

Models 1–4 were used in the subsequent CFA to assess the goodness of fit (Table 3). The fit statistics were calculated using the model for which each item loaded on a single factor. The Chi square/degrees of freedom value was acceptable (≤5.0). But Chi square did not support the model fit representing statistical significance in Models 1–4 due to large sample size. While, the GFI and AGFI values for the four models were close to the recommended value

Fig. 1 Exploratory factor analysis of the revised final 25 items using GGobi. Factor one to four: ○, F1; ●, F2; □, F3; +, F4. To find the optimal projection, (A) linear discriminant analysis, (B) holes, and (C) central mass projection pursuit indexes were used. The coding number of each item was labelled. $N=516$
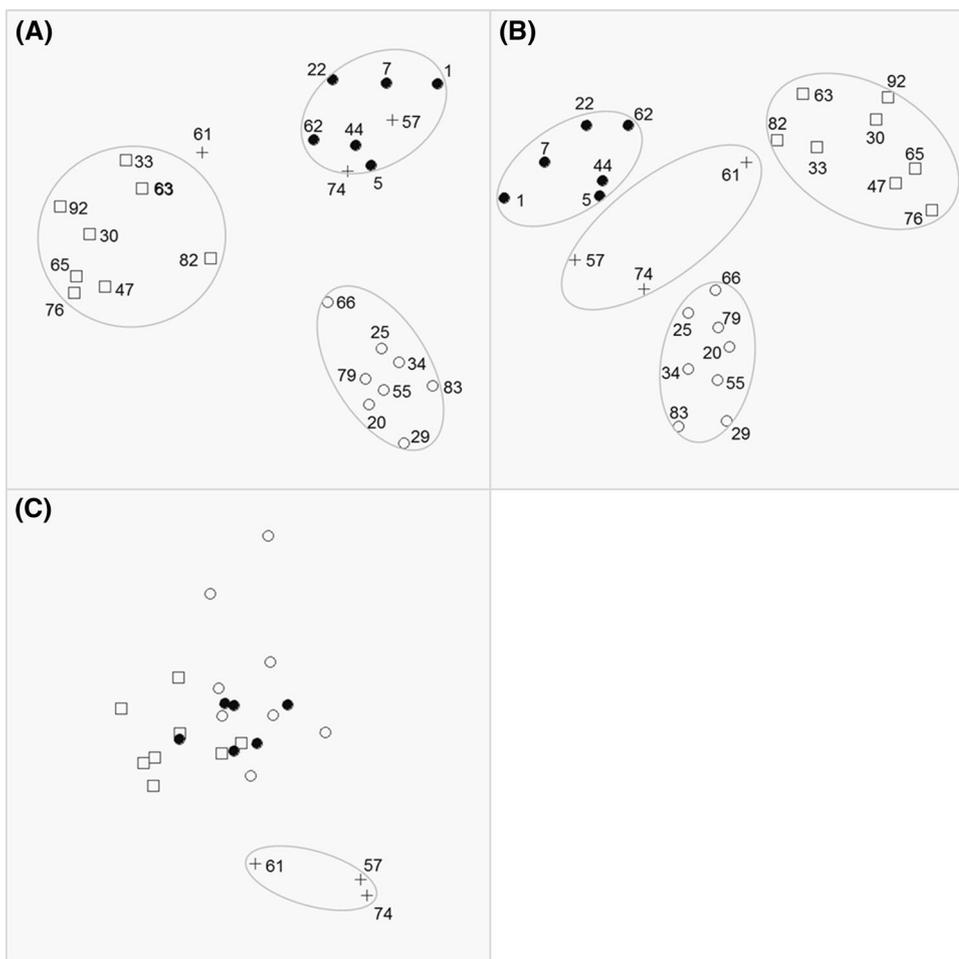
Fig. 2 The structure and components of multidimensional inventory for food involvement. F1–4, factor one to four from the exploratory factor analysis of the revised final 25 items
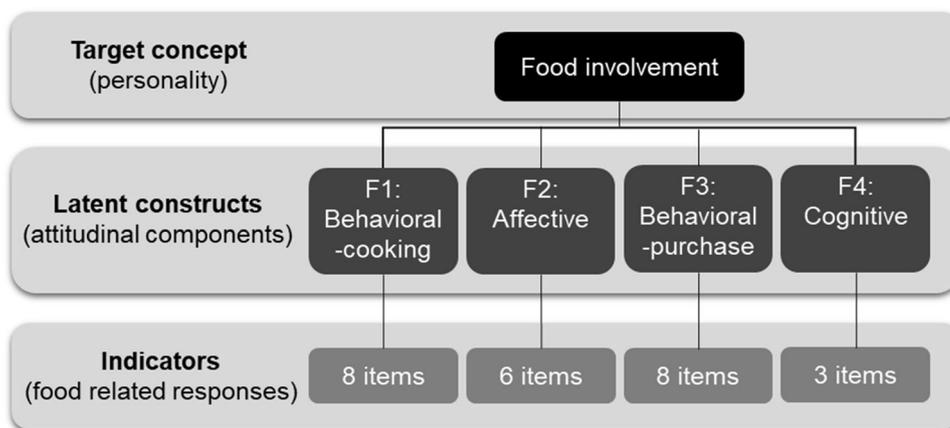
(≥ 0.9), with ranges of 0.85–0.91 and 0.82–0.88, respectively. The RMSEA and SRMR values also supported that the four models exhibited adequate fits that satisfied the respective acceptance thresholds (0.05–0.08 and ≤ 0.08, respectively). Even though no model showed a perfect fit, it was shown that the items tested in the present study were qualified as subscales for the FII. Depending on the issue or product of interest, Models 3 (Fig. 3) and 4, which included or excluded items about cooking, respectively, could be recommended as the options for the FII.

Table 3 Fit indices[a] for confirmatory factor analysis[b] models

Model	χ^2	χ^2/df	p value	RMSEA	GFI	AGFI	SRMR
1	1314.987	3.583	<.000	.071	.847	.819	.058
2	1223.537	3.557	<.000	.071	.851	.824	.059
3	1027.019	3.818	<.000	.074	.859	.830	.060
4	445.843	3.843	<.000	.074	.909	.880	.052

[a] *RMSEA* root-mean-square error of approximation, *GFI* Goodness-of-Fit Index, *AGFI* Adjusted Goodness-of-Fit Index, *SRMR* standardized root-mean-square residual

[b] $N = 516$
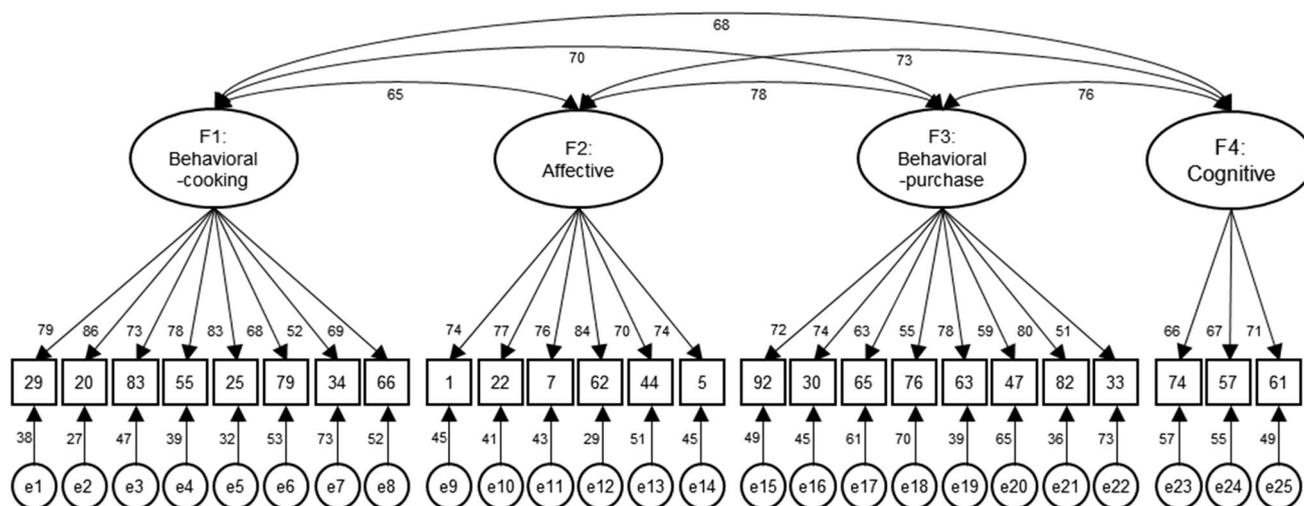
Fig. 3 Confirmatory factor analysis of the revised final 25 items (Model 3). F1–4, factor one to four. The rectangle represents a measured variable, with the item number corresponding to the item. The ellipse is a latent variable (construct), and the circle is a unique factor (measurement error, *e*). The straight and curved arrow indicate the causal effect and correlation, respectively. Parameters estimated are standardized ($\times 100$). $p < 0.0001$. $N = 516$

Important features of the developed FII

Items considering multiple aspects of food involvement

In the previous studies (Juhl and Poulsen, 2000; Mittal and Lee, 1989), there were many possible items that measure involvement as causes or effects of the involvement. This study considered most of these possible items for the FII and tried to identify the effects of food involvement as more feasible items representing behavioral outcomes rather than the cause of food involvement, considering the difficulty of including all multifaceted causes (Laurent and Kapferer, 1985) of food involvement as the items of the FII. Therefore, the FII includes the items on information search and knowledge, as well as interest, pleasure, and importance that have been identified as the main features of involvement in previous studies. Given that individuals' food involvement has a positive correlation with their relevance to food information and knowledge and affects their information perception and purchase decision (Kim and Woo, 2016), eight items were developed to access

consumers' willingness to search for food information (item 20, 79, 34, 66, and 82) and their food knowledge (item 74, 57, and 61). This study included more items to evaluate the decision-making process for food purchase (item 92, 30, 65, 76, 63, 47, 82, and 33), reflecting the importance of food involvement on the purchase decision process.

Constructs explaining food involvement

To describe specific aspects of food involvement, this study defined the constructs of food involvement inventory. The affective construct was included in the present work and measures the emotional aspects of food consumers, such as their interest in, importance of, and concerns toward food. And, the cognitive construct was also included and assessed the knowledgeable state of consumers who have finished information processing through direct and indirect exposure to food or food-related information. These are supported by the previous studies (Zaichkowsky, 1986) which showed that involvement can be classified into

emotional and cognitive types. In addition, the behavioral constructs were also included, because they are affected by the state of emotion and cognition toward foods and associated with the behavioral intention or willingness before acting (Gibbons et al., 1998). While the cognitive construct is about the state after recognizing a food, the behavioral construct is about the progress of cognition and behavior related to a food in certain situations. Especially, the behavioral-purchase and behavioral-cooking constructs in the FII focused more on the drive or willingness of real-life behaviors of food consumers in purchase and cooking situation, respectively. Consequently, the FII utilized three components of attitude (affective, cognitive, and behavioral) for the constructs that characterize and describe the groups of items. Indeed, the items belonging to the same construct corresponded to the same attitudinal component (Table 2). It was a meaningful step forward to define the valid attitudinal constructs for the measurement of food involvement based on the behavioral theory and the empirical investigation.

The involvement inventory focusing on generic foods

The results of this study indicated that the two constructs (symbolic values and risks) were not strongly correlated with the involvement for foods. It might be that the constructs are better applied to high end products, limited editions, collections, or very expensive products. In food, perhaps only specific food categories—rather than generic foods—are related to these constructs. This is because the degree of involvement depends on the type of product, as demonstrated in the previous study (Lee and Lou, 1995). And, another possible reason is that consumers exhibiting a high involvement with food evaluate foods using intrinsic cues (the sensory, physical, and chemical components of food) rather than extrinsic cues (Lee and Lou, 1995). A recent study (Kim et al., 2016) observed that extrinsic environmental cues had little effect on the liking scores of high-involvement consumers. This is consistent with the present study finding that the tested items with extrinsic features (brand and price) were weakly correlated with the other items.

The food involvement inventory reflecting current food lifestyle

This study used the food-related lifestyle approach and considered that current consumers in daily lives are exposed to a variety of foods and massive food-related information in purchasing, cooking, and eating situations. In each situation, for instance, some consumers tend to show many unique aspects of behavior, such as variety, novelty, or sensation seeking and exploratory buying. Therefore, item 79 and 34 reflected that current consumers get information about food through social networking service (SNS), informational website (blog), and TV programs. And, considering the purchase decision process, which significantly relevant to involvement, a few items (item 65, 47, 82, and 33) reflected current society in which consumers can easily access to food information.

Implications and limitations of this study

This study conducted theoretical and empirical research to understand the hierarchical structure of a multiple-item inventory consisting of concepts, constructs, and measurement items, and to construct the FII. It has been validated to confirm that each construct comprises appropriate items and that the constructs were systematically established to examine the food involvement of consumers. The FII can be used as a valid questionnaire, providing not only a criterion of panel screening prior to consumer sensory test but also a factor of data analysis after the test. Accordingly, the FII scores can help analyze and interpret the results of consumer survey on food products. The FII also can be used in practical applications by including or excluding cooking-related items depending on the cooking relevance of the food of interest. However, there are a few limitations that future study may address. Further validation with different population might be necessary for the universal application of the FII. And, the norms for the FII should be developed by accumulating empirical data from a wide range of cultures, ages, and genders in the future. In addition, given the concerns of content validity analysis by a few numbers of experts, future study will need to apply software for the content validity analysis of the FII.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval Ethical approval for the studies in the present research was obtained from Institutional Review Board (#99-25).

Appendix

See Table 4.

Table 4 The food involvement inventory

Item (English)	Item (Korean)	Construct[a]
I spend much time and effort for choosing food	식품/음식을 고르는데 시간이나 노력을 들인다	CG
I like cooking	요리하는 것을 좋아한다	BC
I look for relevant information before purchasing food	식품/음식을 구매하기 전, 관련된 정보를 찾아본다	BP
I can recommend certain food items to others	다른 사람에게 식품/음식을 추천해 줄 수 있다	CG
I enjoy talking about food	식품/음식에 대해 이야기하는 것이 즐겁다	AF
I often prepare food and share with people	종종 음식을 준비하여, 사람들과 함께 먹는다	BC
When I choose food, I am confident in my choice	식품/음식을 선택할 때, 내 선택에 확신이 있다	CG
I am very concerned about what I eat	무엇을 먹는가는 나의 중요한 관심사이다	AF
I have knowledge about food and cooking	식품/음식이나 요리에 대한 지식이 있다	BC
I consider many things when I buy food	식품/음식을 구매할 때, 여러 사항을 고려한다	BP
I often think about what I ate or am going to eat	무엇을 먹었는지 또는 먹을지 자주 생각한다	AF
Generally I can specify the reason why I chose a particular food	식품/음식을 선택할 때, 대부분 그 이유를 구체적으로 말할 수 있다	CG
I look for several retailers (on-line and off-line) before purchasing food	식품/음식을 구매하기 전, 여러 판매처(온·오프라인)를 살펴본다	BP
I enjoy food-related TV programs	식품/음식 관련 TV 프로그램을 즐겨 본다	BC
After eating delicious food elsewhere, I make it myself	맛있는 식품/음식을 먹게 되면, 직접 만들어 보곤 한다	BC
I enjoy food-related information on SNS and blogs	SNS나 블로그에 있는 식품/음식 관련 정보를 즐겨 본다	BC
I enjoy buying and preparing food	식품/음식을 사거나 준비하는 것을 즐긴다	BC
I am interested in recipes	요리법에 관심이 있다	BC
Food gives me pleasure	식품/음식은 나에게 즐거움을 준다	AF
I try to buy satisfactory food	만족스러운 식품/음식을 구매하기 위해 노력한다	BP
Food is an important part of my life	식품/음식은 내 생활의 중요한 부분이다	AF
I focus on information about food	식품/음식에 관한 정보에 집중한다	CG
I am interested in food	식품/음식에 관심이 있다	AF
I compare different options before purchasing food	식품/음식을 구매하기 전, 선택 가능한 후보들을 비교한다	BP
When I buy food, I check the information on the package	식품/음식을 구매할 때, 포장에 있는 정보를 확인한다	BP

[a] *BC* behavioral-cooking, *AF* affective, *BP* behavioral-purchase, *CG* cognitive

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