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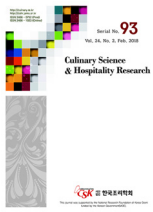

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Awareness of Adulterated Food and Its Management Beliefs and Capabilities among Teenagers' Parents

Yunhwa Kim†

Dept. of Food and Nutrition, Yeungnam University, South Korea

KEYWORDS

Adulterated food management,
Awareness,
Capability,
Belief,
Teenagers' parent.

ABSTRACT

Food adulteration and food fraud should not be neglected. The present study aimed to investigate the awareness of adulterated food and its management beliefs and capabilities among teenagers' parents. Data were collected from 425 adolescents' parents having different levels of income and education. The results of factor analysis indicated that adulterated food management beliefs was classified into attitude, necessity, and anxiety. The adulterated food management capability was sub-grouped into hygiene and nutrition, knowledge, citizen action and environmental grasp. The adulterated food management capabilities were significantly different according child's school, education level and monthly income (p<0.05). The attitude factor of adulterated food management beliefs appeared to have a significant (p<0.05) impact on all factors of adulterated food management capabilities, however the necessity factor had a significant (p<0.001) impact only on factor of hygiene and nutrition. The results of the present study suggested that parents need to be aware themselves as well as to teach their children about right food selection and consumption. The findings of the study might be useful in government policy planning regarding the public health issues and dietary education of adolescents and parents.

1. INTRODUCTION

Food safety is one of the major global public health issues concerning sound health. FAO/WHO (2003) defines food safety as 'all those hazards, whether chronic or acute, that may make food injurious to the health of the consumer'. Among the various potential food hazards microbiological contamination and chemical hazards have received most attention. However, food adulteration and food fraud should not be neglected considering their role in public health FAO/WHO (1986). Food adulteration has become a global problem for a long time. Consumers pay more for lower quality food items and are prone to health hazards as well. Either removal of an important component from or addition of harmful substances to the foods might be the reasons for health hazards (Srilakshmi, 2003). Sometimes the adulterations may lead to death (FAO/WHO, 2003). Harmful chemicals are added to the foods to make the products more lucrative, increase shelf-life, substitute for unavailable natural raw materials, and also to reduce price of the goods (Hossain, Heinonen, & Islam, 2008).

Easy accessibility to food ingredients and the commercial interests to produce food products at lower costs by industry

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† Corresponding author: Yunhwa Kim, Department of Food and Nutrition, Yeungnam University, 280 Daehak-Ro, Gyeongsan, Gyeongbuk 38541, South Korea, Tel. +82-53-850-4283, Email: kyhwa47@gmail.com

have led to an increase in the incidents of adulterations around the world (Peng et al., 2017). Food adulterations in Taiwan also included the use of food additives with plasticizers, starch products with maleic anhydride, olive oil with copper chlorophyll, lard with recycled cooking oil, and processed soymilk curd with dimethyl/diethyl yellow (Peng et al., 2017). Most of the food items collected from the respondents' residents were found adulterated in a study conducted in India (Beniwal & Khetarpaul, 1999). Almost half of the samples of sweetmeats and confectionary items were adulterated with non-permitted food colors in Pakistan (Ashfaq & Masud, 2002). Recently in Korea, there have been reported dangerous "nitrogen sweets" (nitrogen gas is injected into the bag to smoke out of the mouth like a dragon), resulted in perforating the stomach of a teenage (KBS, 2017).

As problems related to food safety are increasingly becoming a global issue, the Korean government announced adulterated foods to be a social evil, in order to resolve the risks associated with food and the public's anxiety (Joo & Lee, 2013). And the Korean government has established a food safety zone within 200m of schools, in an effort to provide healthy food to children (Ministry of Food and Drug Safety, 2017). However, a wide variety of preference foods that include excess sugars and food additives, as well as unhygienically cooked food, are sold in shops around schools (Kim, 2016a; Park & Son, 2010). Moreover, growing teenagers with increasing appetites and poor economic conditions are easily tempted to eat cheaper foods, and foods that are more attractive in taste and color due to adulteration (Brown, Shaibu, Maruapula, Malete, & Compher; 2015; Contento, Williams, Michela, & Franklin, 2006; Kim, 2016b; Schroeder & Sonneville, 2016).

Providing food safety education to youths, the future parents, through food safety and competency management training would also be effective. Parents could be good motivators to help teenagers consider possible adulterated food items (Kim, 2016b; Park & Sohn, 2010). And parents have the greatest influence on the eating habits, food purchasing behaviors, and food safety practices of their children (Kwon, Wilson, Bednar, & Kennon, 2008; Monge-Rojas et al., 2010; Moskvicheva, Bordovskaia, Dudchenko, & Borisova, 2016). So, active promotional and educational activities about the adulterated food should be conducted targeting the parents. This study aimed to investigate and identify the awareness of adulterated food and its management beliefs and capabilities among teenagers' parents.

2. LITERATURE REVIEW

2.1. Adulterated Foods and Awareness

In general, adulterated foods are referred to cheap foodstuffs, foods using harmful and harmful substances that are toxic or unusable, foods that mislead the size, weight, and weight of the contents, foods that use or mimic other ingredients, foods that do not receive permits or notifications, and false foods that mislead or confuse consumers (Easy to Find, Practical Law, 2017). Modern society is food risk society, there is a risk of distribution of adulterated food (Kim, Yoon, & Kim, 2012), and peoples' attitude towards adulterated foods could address the safety of food in our society. In recent years, studies have been carried out regarding food safety and culture issues. In a study conducted on the reception of discourse of healthy food among young women in Korea reported participants' sociocultural background on the discourses of healthy food and explored the reception process by examining discourses characteristics (Kang, 2016). Kim, Yoon, and Kim (2012) studied the structure and dynamics of food risk in society. Choi, Jeon, Hwang, and Nam (2005) conducted a survey on consumer perception of food-related hazards and degree of concern about food and pointed a need to introduce safety system in the production of agriculture products. The following research first question was addressed: (1) Are there any differences in the awareness of parents on adulterated food by their children's school level, education level and income?

2.2. Adulterated Foods Management Beliefs and Capacity

Food safety incidents not only result in serious injuries to people's health but they can also dramatically damage consumers' confidence in the safety and affect consumers' attitudes (Barbarossa, Pelsmacker, Moons, & Marcati, 2016; Röhr et al, 2005; Verbeke, 2001). In the study of Kim and Lee (2010), housewives' information needs on food safety is high, the information was gained through the mass media, education, and promotion materials about food safety, mainly TV, radio, and newspaper. Attitude has mediating effect on the relationship between knowledge and behavior, food safety knowledge causes positive impact on behavior (Baser, Ture, Abubakirova, Sanlier, & Cil, 2017). Also in scientific literature several food safety problems and incidents are attributed to

practices, attitudes or behavior (Boeck, Mortier, Dequidt, & Vlerick, 2017). Although, relationship to actions is not simply causal but is more complex, beliefs are the basis of actions, (Alisaari & Heikkola, 2017). Some studies including both ability and belief measures have generally demonstrated relationships between cognitive ability and epistemic beliefs (Bråten & Ferguson, 2014). Few studies on the issue of food hygiene have been conducted from the perspective of competence, beliefs and knowledge (Burchi & Muro, 2016; Hwang & An, 2014; Hwang & Jeon, 2016; Meysenburg, Albrecht, Litchfield, & Ritter-Gooder, 2014; Seong, Choi, & Kim, 2014). So the following research would be meaningful to grasp the relationship between parents' awareness, beliefs and capacity of adulterated food management in order to strengthen their children. The following research second question was addressed: (2) How adulterated food management awareness and beliefs influences adulterated food management capability of adolescent's parents?

3. METHODS

3.1. Subjects

Subjects of this study were parents of students' attending 4 elementary (grade 5～6), 4 middle (grade 1～3) and 4 high schools (grade 1～3) in Daegu, Korea. Data was collected from parents of elementary, middle, and high school students through their children using a self-administered questionnaire with 5-Likert scale in March and April of 2015. Excluding incomplete responses on awareness of adulterated food or other major study variables, data of 425 students (96.2% of completion rate) were used for statistical analysis. This study was approved by the Institutional Review Board of Youngnam University (IRB-7002016-A-2015-005).

3.2. Measurement and Statistical Analysis

The draft of the survey questionnaire was developed based on literature reviews regarding adulterated food management and related factors among adolescents' parents (Choi, Jeon, Hwang, & Nam, 2005; Kim, Yoon, & Kim, 2012; Meysenburg, Albrecht, Litchfield, & Ritter-Gooder, 2014; Park & Sohn, 2010). Awareness of adulterated food embraced concerns about adulterated food, government management of food adulteration food in our society, and information satisfaction. Adulterated food management was measured by the beliefs and capabilities. After several revisions of the draft, the final survey questionnaire included items measuring general characteristics, awareness of adulterated food and its management beliefs and capabilities. General characteristics included school of child, education level, and monthly income.

The statistical analysis was performed with SPSS software (version 23). The differences of awareness of adulterated food and its management beliefs and capabilities according to general characteristic were used percentages, mean±S.D., *t*-test and ANOVA with Duncan's multiple rang test. To investigate the relevance of the awareness of adulterated food and its management beliefs and capability was performed with a correlation and regression analysis.

4. RESULTS

4.1. General Characteristics of the Subjects

The study was conducted among 425 parents of elementary (145, 34.1%), middle (142, 33.4%), and high school (138, 32.5%) students' parents living in Daegu, Korea. Out of 425 respondents, 98 had high school and 327 had college or higher level of education. Monthly income of 76 (17.9%) respondents was less than 300, of 165 (38.8%) was 300～500, of 94 (22.1%) was 500～700, and of 90 (21.2%) was more than 700 million Won (Table 1).

4.2. Factor Analysis for Adulterated Food Management Beliefs and Capabilities of the Subjects

Tables 2 and 3 show the beliefs and capabilities factors which support adulterated food management among teen-

Table 1. General characteristics of the study subjects (N=425)

Factor		N (%)
Children/school	Primary	145(34.1)
	Middle	142(33.4)
	High	138(32.5)
Education level	≥College	327(76.9)
	≤High school	98(23.1)
Monthly income (₩10,000)	<300	76(17.9)
	300～500	165(38.8)
	500～700	94(22.1)
	700≤	90(21.2)

Table 2. Factor analysis for adulterated food management beliefs of the subjects

	Variable	Loading	Eigen value	Accumulation variance (%)	Cronbach's α
Attitude	I think I should report them who adulterated food manufacturers and distributors.	0.85	2.63	29.26	0.84
	I think we can reduce the junk food with attention and effort.	0.78			
	I think that adulterated food must be disappear in our society.	0.71			
	I think we should know about knowledge and information about the junk food.	0.71			
Necessity	Hygienic diet helps to prevent illness (cancer, endocrine disorders, etc.).	0.75	2.06	52.13	0.72
	I think we need adulterated food management for the happiness of our family.	0.73			
	I think adulterated food information helps secure food purchasing.	0.68			
Anxiety	I guess it is very difficult to obtain accurate information on adulterated food.	0.89	1.41	67.76	0.57
	I think that the government do not properly managing the adulterated foods in our society.	0.76			

agers' parents. Factor analysis were conducted using principal component analysis and Varimax rotation, and reliability was proven using Cronbach's α. The results of factor analysis indicated by adulterated food management beliefs were classified into attitude, necessity, and anxiety factors (Table 2). Factor 1 is about knowledge and information of adulterated food manufacturers and the respondents thought they must report about adulterated food manufacturers and distributors when they learned about it. They thought it could reduce the adulterated food with interest and effort, and the adulterated food must be disappeared from our society. Factor 2 is necessity, respondents believed that the hygienic foods help prevent illness like cancer, endocrine disorders, etc.; adulterated foods should be managed for the happiness of their family; and it also helps to purchase of safe foods. Anxiety was measured as the Factor 3 of adulterated food management beliefs. Respondents believed that it was very difficult to get accurate information about adulterated foods and the government's management system for adulterated foods was not adequate. Cronbach'α results confirm the value of factor 1 for attitude, necessity, and anxiety was 0.84, 0.72, 0.57, respectively.

The results of adulterated food management capability were categorized into four factors as hygiene and nutrition, knowledge, citizen action, and environmental grasp (Table 3). Factor 1, hygiene and nutrition was considered for sanitary manner of food, health guidance to children, hand washing before cooking and eating, domestic cooking environment, purchasing of safe and nutritious foods. Poor food hygiene and nutritional factors in foods which threaten the public health and emotions could be a key factor of poor food management capabilities. Factor 2 described the kind of prohibited food additives, other kinds of risk of adulterated foods, the type and identification of pathogenic microorganisms, and fast and accurately information obtained with respect to adulterated foods. The knowledge and information on hazards of adulterated foods for the health could be perceived as poor food management factors. Factor 3 consisted of citizen actions, which included participation in boycotting against the non-hygienic food retailers and reporting about adulterated food manufacturers and distributors, was named civic competence. Factor 4, environmental grasp was related to the health and nutrition of school meals and the food and environmental hygiene around the school. Reliability factor analysis as Cronbach'α mean for adulterated food management capability showed the value of the factors 1, 2, 3, and 4 of 0.86, 0.79, 0.62, and 0.63, respectively.

4.3. Differences of Awareness of Adulterated Food and Its Management Beliefs and Capabilities

The data for comparing the differences of factors of awareness and beliefs and capabilities for the adulterated food management by school-level of parents' child, education level of parents, economic status (monthly income) of parents are shown in Table 4. The value for concern on adulterated food among parents was 3.47±0.86 which did not show any significant differences among other parents of middle and high school students. Concern on adulterated foods among highly educated parents was significantly higher (p<0.05), however was significantly lower among those having monthly income of less

Table 3. Factor analysis for adulterated food management capabilities of the subjects

	Variable	Loading	Eigen value	Accumulation variance (%)	Cronbach's α
Hygiene and nutrition	I managed to keep food hygienically.	0.79	3.83	25.52	0.86
	I'm guiding my son (daughter) healthy and hygienic eating habits.	0.76			
	I'm leading my son (daughter) hand washing.	0.76			
	I cooked hygienically food for my family.	0.73			
	I buy hygiene and safety food.	0.72			
	I have managed nutritionally my family's diet.	0.67			
	I always wash my hands before cooking.	0.64			
Knowledge	I know the kinds of banned food additives.	0.79	2.66	43.24	0.79
	I can explain to others about the dangers of adulterated food and kind.	0.75			
	I know about the type and risk of pathogenic microorganisms.	0.75			
	I obtained fast and accurately the information relating to adulterated food.	0.65			
Citizen action	I can participate in a boycott against the non-hygienic food retailers.	0.81	1.61	53.97	0.62
	I can report adulterated food manufacturers and distributors when I suffers the damage by them.	0.77			
Environmental grasp	I know meal hygiene and nutrition of my son (daughter)'s school.	0.82	1.48	63.86	0.63
	I know about food hygiene of my son and daughter's school around.	0.78			

than 3 million Won compared to the other groups (p<0.01).

The average score of adulterated food management competence factors was high as 4.15±0.58 points. Significantly lower p<0.001) value for hygiene and nutrition was found among parents of middle school students' parents. Parents having 500 million won or more of monthly income showed significantly (p<0.001) high awareness of the adulterated food management attitude factors. The average score of the anxiety factors were not significantly different in each group 3.49±0.69 points.

The average score of adulterated food management capacity was the 3.62±0.49 points, the average score for management capacity of middle school parents were significantly (p< 0.01) lower compared to elementary and high school parents. It was significantly (p<0.05) higher in parents of college or higher education than in high school. Similarly, significantly high (p<0.001) score for management capacity was found among the parents having more than 500 million Won of monthly income as compared to other groups.

4.4. Correlation of Awareness of Adulterated Food and Its Beliefs and Capabilities

Correlation among the factors of awareness of adulterated food and its management beliefs and capabilities of teenagers' parents are shown in Table 5. Concern for adulterated foods showed a significant (p<0.01) positive correlation with attitude, necessity, hygiene and nutrition, knowledge, citizen action, and environmental grasp factors. Awareness on government management for adulterated foods showed a significant (p<0.05) correlation with anxiety, knowledge, and environmental grasp factors. Information satisfaction for adulterated foods showed a significant (p<0.01) correlation with necessity, anxiety, knowledge, and environmental grasp factors. Although all the factors for adulterated foods beliefs except anxiety and capabilities showed a significant (p<0.01) positive correlation each other, anxiety factor had significant (p<0.01) negative correlation with knowledge factor.

4.5. The Relationship of Awareness of Adulterated Food and Its Beliefs and Capabilities

Regression analysis was conducted to identify the relationship between perceptions of adulterated foods and the management beliefs and competences of teenage parents. The results of regression analysis of the effect of the awareness of the subjects on adulterated food management beliefs and capa-

Table 4. Differences of awareness of adulterated food and its management beliefs and capabilities by general characteristics (Mean±S.D.)

Factors		Total (n=425)	Child's school				Education level			Monthly income (₩10,000)				
			Primary (n=145)	Middle (n=142)	High (n=138)	*F*	≥College (n=327)	≤High school (98)	*t*	<300 (n=76)	300～500 (n=165)	500～700 (n=94)	700≤ (n=90)	*F*
Awareness	Concern	3.47±0.86	3.57±0.74	3.48±0.92	3.36±0.90	2.056	3.53±0.84	3.30±0.90	2.274*	3.13±0.91[b]	3.50±0.77[a]	3.54±0.77[a]	3.63±1.00[a]	5.336**
	Government management satisfaction	2.43±0.70	2.36±0.72	2.39±0.66	2.54±0.73	2.498	2.41±0.70	2.47±0.71	−0.667	2.39±0.75	2.43±0.69	2.52±0.67	2.36±0.73	0.915
	Information satisfaction	2.49±0.69	2.48±0.74	2.49±0.66	2.51±0.68	0.058	2.49±0.69	2.51±0.69	−0.257	2.53±0.64	2.48±0.69	2.52±0.68	2.46±0.74	0.248
Beliefs	Attitude	4.15±0.58	4.26±0.48[a]	4.20±0.60[a]	3.97±0.62[b]	9.913***	4.17±0.55	4.09±0.67	1.25	3.90±0.65[b]	4.15±0.59[b]	4.22±0.49[a]	4.27±0.52[a]	6.59***
	Necessity	4.19±0.56	4.29±0.50[a]	4.15±0.58[b]	4.13±0.60[b]	3.157*	4.22±0.54	4.10±0.62	1.75	4.04±0.56[b]	4.19±0.57[ab]	4.22±0.54[ab]	4.30±0.55[a]	3.21*
	Anxiety	3.49±0.69	3.47±0.68	3.57±0.71	3.43±0.68	1.532	3.49±0.69	3.51±0.71	−0.20	3.46±0.73	3.49±0.68	3.53±0.66	3.48±0.72	0.17
Management competence	Hygiene and nutrition	4.03±0.51	4.08±0.47[a]	3.92±0.55[b]	4.10±0.49[a]	5.323**	4.06±0.49	3.92±0.54	2.37*	3.84±0.51[b]	3.94±0.49[b]	4.19±0.45[a]	4.19±0.50[a]	12.38***
	Knowledge	3.00±1.01	3.13±1.46	2.86±0.66	3.01±0.65	2.642	3.02±0.88	2.95±1.36	0.52	2.89±0.65[ab]	2.89±1.05[b]	3.10±1.32[ab]	3.22±0.74[a]	2.70*
	Citizen action	3.79±0.70	3.87±0.65	3.71±0.75	3.79±0.68	1.820	3.82±0.69	3.69±0.71	1.67	3.56±0.78[c]	3.74±0.71[bc]	3.88±0.65[ab]	3.99±0.57[a]	6.30***
	Environment grasp	3.22±0.70	3.37±0.67[a]	3.16±0.67[b]	3.14±0.72[b]	4.951**	3.24±0.70	3.14±0.68	1.33	3.11±0.65	3.20±0.69	3.22±0.67	3.35±0.77	1.63
	Total	3.62±0.49	3.70±0.58[a]	3.51±0.47[b]	3.64±0.430[a]	5.757**	3.64±0.46	3.52±0.60	2.09*	3.45±0.42[b]	3.53±0.50[b]	3.72±0.50[a]	3.79±0.47[a]	10.11***

* $p<.05$. ** $p<.01$. *** $p<.001$.

Significant difference was determined by Duncan test at $p<0.05$.

Table 5. Correlation of awareness of adulterated food and its management beliefs and capabilities

Factors		Awareness			Belief			Management capability			
		Concern	Government management satisfaction	Information satisfaction	Attitude	Necessity	Anxiety	Hygiene and nutrition	Knowledge	Citizen action	Environment grasp
Awareness	Concern	1									
	Government management satisfaction	−0.00	1								
	Information satisfaction	−0.02	0.49**	1							
Belief	Attitude	0.46**	−0.06	−0.08	1						
	Necessity	0.33**	−0.05	−0.12*	0.64**	1					
	Anxiety	0.03	−0.31**	−0.32**	0.14**	0.13**	1				
Management capability	Hygiene and nutrition	0.27**	−0.01	0.03	0.41**	0.43**	0.01	1			
	Knowledge	0.13**	0.16**	0.18**	0.14**	0.12*	−0.11*	0.33**	1		
	Citizen action	0.30**	0.03	0.05	0.51**	0.33**	0.02	0.31**	0.25**	1	
	Environment grasp	0.28**	0.10*	0.17**	0.23**	0.14**	−0.07	0.37**	0.34**	0.27**	1

* $p<.05$. ** $p<.01$.

bilities are shown in Table 6. Attitude ($p<0.001$, $R^2=0.21$) factor of the beliefs of the adulterated food management were significantly affected by concern factor of awareness of adulterated food. Necessity ($p<0.001$, $R^2=0.11$) factor of the beliefs of the adulterated food management were significantly affected by concern and information satisfaction factors of awareness of adulterated food. Anxiety factor was significantly affected by government management and information satisfaction factor of awareness of adulterated food ($p<0.001$, $R^2=0.13$). The concern factor of the awareness of the adulterated food management significantly ($p<0.01$) affected on hygiene and nutrition, knowledge, citizen action, and environment grasp factors of adulterated food management capabilities. The information satisfaction factor of awareness of adulterated food affected on knowledge and environment grasp factors of adulterated food management capabilities were significantly different ($p<0.05$).

The results of regression analysis of the effect of the beliefs on capabilities of adulterated food management are shown in Table 7. Attitude factor of the beliefs significantly affected on hygiene and nutrition, knowledge, citizen action, and environment grasp factors of adulterated food management capabilities were significantly different ($p<0.05$). Necessity factor significantly ($p<0.001$) affected on hygiene and nutrition factor of adulterated food management capabilities. Anxiety factor significantly ($p<0.05$) affected on knowledge and environment grasp factors of adulterated food management capabilities. Results of the present study imply that in order to solve the social problem of adulterated foods, the parents are required to have participated in the training and other educational activities to increase their competencies to address the problem.

5. CONCLUSIONS AND DISCUSSION

The average score for adulterated food management capacity of the parents was high for the factors like hygiene and nutrition, citizen action, environment grasp, and knowledge. This result was higher than their children's adulterated food management capacity point (3.25±0.50) which was sub-grouped into environmental grasp, food identification, cooking hygiene, and situation management (Kim, 2016b). Management competency score showed significant ($p<0.001$) differences depending on the child's school, education, and income of the parents. Education and income were the factors shown to significantly affect the poor food

Table 6. Effect of adulterated food awareness on adulterated food management beliefs and capabilities

Dependent variable (adulterated food management belief and capability)		Independent variable (awareness on adulterated food)	β	*t*	*F*	R^2
Belief	Attitude	Concern	0.45	10.46***	37.78***	0.21
		Government management satisfaction	−0.02	−0.44		
		Information satisfaction	−0.07	−1.30		
	Necessity	Concern	0.32	7.03***	18.59***	0.11
		Government management satisfaction	0.00	0.04		
		Information satisfaction	−0.11	−2.13*		
	Anxiety	Concern	0.02	0.51	21.06***	0.13
		Government management satisfaction	−0.20	−3.88***		
		Information satisfaction	−0.22	−4.14***		
Capability	Hygiene and nutrition	Concern	0.27	5.81***	11.45***	0.08
		Government management satisfaction	−0.03	−0.61		
		Information satisfaction	0.05	0.87		
	Knowledge	Concern	0.13	2.78**	8.16***	0.06
		Government management satisfaction	0.09	1.69		
		Information satisfaction	0.13	2.45*		
	Citizen action	Concern	0.30	6.44***	14.17***	0.09
		Government management satisfaction	0.01	0.14		
		Information satisfaction	0.05	0.90		
	Environment grasp	Concern	0.28	5.96***	16.10***	0.10
		Government management satisfaction	0.02	0.45		
		Information satisfaction	0.16	2.96**		

* $p<.05$. ** $p<.01$. *** $p<.001$.

management capabilities, which can be seen to reflect the differentiation of food consumption between social classes. Kim, Yoon and Kim (2012) while studying the differentiation patterns of care and anxiety about food, depending on income and level of education of men and women over the age of 19, reported significant differences in the interest towards adulterated foods on the basis of differences in education and income level.

The adulterated food management beliefs factor was high in the order of recognition of the necessity, attitudes, and anxiety. Attitudes about the adulterated food management was significantly ($p<0.05$) different in the child's school and income. Necessity of adulterated food management showed a significant correlation with anxiety, hygiene and nutrition, knowledge, citizen action and environmental grasp that implied a need for addressing the adulterated food management issue. High anxiety of adulterated food management indicated that even low level of knowledge about the adulterated food management is expected to help reduce psychological anxiety through the acquisition of related knowledge. Therefore, the government and the schools may need to conduct educational and other publicity related awareness programs (Cunha, Cipullo, Stedefeldt & Rosso, 2015).

The management capabilities factors, hygiene and nutrition, knowledge, citizen actions, and environment grasp were significantly correlated with management beliefs factors ($p<0.05$). Poor food hygiene and nutritional factors in foods which threaten the public health and emotions could be a key factor of poor food management capabilities. The knowledge and information on hazards of adulterated foods for

Table 7. Effect of adulterated food management beliefs on adulterated food management capabilities

Dependent variable (adulterated food management capability)	Independent variable (adulterated food management belief)	β	*t*	*F*	R^2
Hygiene and nutrition	Attitude	0.22	4.40***	38.86***	0.22
	Necessity	0.25	4.81***		
	Anxiety	−0.04	−1.36		
Knowledge	Attitude	0.22	2.03*	5.73**	0.04
	Necessity	0.10	0.84		
	Anxiety	−0.20	−2.80**		
Citizen action	Attitude	0.62	9.30***	48.64***	0.26
	Necessity	0.00	0.02		
	Anxiety	−0.05	−1.18		
Environment grasp	Attitude	0.30	4.03***	9.54***	0.07
	Necessity	−0.1	−0.12		
	Anxiety	−0.11	−2.24*		

* $p<.05$, ** $p<.01$, *** $p<.001$.

the health could be perceived as poor food management factors. Hunt (1999) and Jackson and Everts (2010) argue that anxiety has social as well as personal significance insofar as it is a shared experience that results in some discernible action by significant numbers of people, and anxiety may affect social entities such as organizations and governments whether or not particular individuals are psychologically troubled (Zhu, Jackson, & Wang, 2017). Food adulteration is an age-old problem especially where there is a challenge between the physical availability of, and the market demand for, a food item (Manning & Soon, 2014). Food adulteration can be described as the actions that are taken to add or adjust a food item or composite food product by the use of extraneous, substandard, or inferior ingredients. Food fraud may be carried out intentionally for economic gain, with the associated actions undertaken to avoid detection by regulatory bodies or consumers (Grundy et al., 2012; Manning & Soon, 2014).

The attitude factor of adulterated food management beliefs appeared to have a significant ($p<0.05$) impact on all factors of adulterated food management capabilities, the necessity factor was having a significant ($p<0.001$) impact only on hygiene and nutrition. They thought it could reduce the adulterated food with interest and effort, and the adulterated food must be disappeared from our society. Modern society is food risk society, there is a risk of distribution of adulterated food (Kim, Yoon, & Kim, 2012), and peoples' attitude towards adulterated foods could address the safety of food in our society. Respondents believed that it was very difficult to get accurate information about adulterated foods and the government's management system for adulterated foods was not adequate. Adulterated food, one of the four evils of society in Korea, is the main public concern from health and safety perspective (Kim, 2016a).

The parents of the teenage students in present study were aware of the adulterated foods, however they showed very low levels of satisfaction for the opportunities they got to have information and education about the adulterated foods. Increasing satisfaction and information on adulterated foods among teenagers' parents is crucial to strengthen their overall management capabilities of adulterated foods. The parents need to be aware of the good foods on themselves as well as to teach their children about it so that they could get adequate knowledge of right food selection and consumption that influence their health. This will help address the social risks and food insecurity which can be a driving force to create a healthy society. Although there is limited published data on the awareness of adulterated food among teenagers' parents, the results of this study may help formulate appropriate policy measures to address food adulteration and ensure the safety and integrity of food the adolescents buy and consume.

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