

Dieticians' intentions to recommend functional foods: The mediating role of consumption frequency of functional foods

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Abstract

This study explored the conceptual framework of dieticians' intentions to recommend functional food and the mediating role of consumption frequency. A web-based survey was designed using a self-administered questionnaire. A sample of Korean dieticians (N=233) responded to the questionnaire that included response efficacy, risk perception, consumption frequency, and recommendation intention for functional foods. A structural equation model was constructed to analyze the data. We found that response efficacy was positively related to frequency of consumption of functional foods and to recommendation intention. Consumption frequency also positively influenced recommendation intention. Risk perception had no direct influence on recommendation intention; however, the relationship was mediated completely by consumption frequency. Dieticians' consumption frequency and response efficacy were the crucial factors in recommending functional foods. Dieticians may perceive risks arising from the use of functional foods in general, but the perceived risks do not affect ratings describing dieticians' intentions to recommend them. The results also indicated that when dieticians more frequently consume functional foods, the expression of an intention to recommend functional foods may be controlled by the salience of past behaviors rather than by attitudes.

Key Words: Dieticians, functional foods, consumption frequency, recommend intention

Introduction

New kinds of foods, so-called functional foods, have been developed in recent years, providing a new approach to healthy eating by linking certain components with certain health benefits in a single product. Functional food was defined as "any food or food ingredient that may provide health benefits beyond the traditional nutrients it contains" [1]. Foods can serve as medicines for preventive health care, an important concept behind functional food [2]. Over the last few decades, research has demonstrated what makes functional foods acceptable to consumers. Consumer acceptance of functional foods is multidimensional; demographic factors include gender, age, and education [3,4,5], while product factors include price and taste [4,6], and psychological factors include confidence and/or concerns about functional foods [7,8].

One way to predict consumer behavior is to measure attitudes [9], which can explain individual behavioral intention [10]. Many papers have stated that attitude affects and predicts food choice behavior [6,11-17]. When consumers first encounter functional foods, the main attitude may focus on response efficacy: health can be improved by functional foods. Response efficacy explains the extent to which a person believes a particular health care action mitigates a health threat [4,6]. Urala & Lähteenmäki

(2004) reported that the rewards of using functional foods increased functional food use. Therefore, high response efficacy would result in an intention to recommend functional foods. On the other hand, negative attitudes about the safety and credibility of functional foods or that functional foods can even be harmful for healthy people describes risk perception. Individual suspicion about possible harmful effects eventually decreases the willingness to purchase functional foods. [14] emphasized that consumer risk perceptions were important in whether consumers would accept functional foods. [18] found that the risk perception about enrichment with omega-3 fatty acid influenced the behavior intention to consume omega-3 oils. Therefore, the perception that functional foods are risky would negatively influence the intention to recommend that others purchase functional foods.

Attitude measurements thus may provide a suitable tool for predicting consumer acceptance of functional foods. However, reasons for choices often remain unclear, because consumers make food choices based on habitual structures [19,20]. Habitual behavior is frequent repetition of past behavior [21] and is an important predictor of future behavior [22,23]. Frequency of past consumption may be an important determinant of food choice behaviours [23-29]. To illustrate, [24] noted that consumers with different habituation levels in fat had different preferences in food

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products. [25,26,28] showed that food consumption was related to past behavior. [29] further reported that three segments in consumption frequencies, namely sporadic, occasional, and habitual consumers, resulted in different purchasing decisions of quality wine. Consumption frequency was also affected by predictors like socio-economic, demographic, or psychological variables [30-32].

When consumers experience a high level of response efficacy and low level of risk perception of functional foods, they perceive greater value for the money paid. Increased value perceptions then contribute to increased consumption frequency. Perceived attitudes about quality and value are good predictors of consumer willingness to recommend a certain product to others [33] From this perspective, we assume in this study that consumption frequency positively relates to recommendation intention for functional foods and also mediates the relationship between risk perception/response efficacy and recommendation intention for functional foods.

On the other hand, the dynamic nature of health care, particularly the growth in the older population, increases in health care costs, and awareness of enhancing personal health and advancing scientific evidence, increasingly attracts consumers to functional foods. Thus, healthcare practitioners should understand functional foods because they (specifically dieticians) are the ones who have primary responsibility for nutrition education and medical nutrition therapy [34]. Dieticians could incorporate functional foods into nutrition counselling plans and education programs when consumers demand alternative ways to enhance health and prevent disease by translating scientific information into practical language [35]. However, although much research has examined general consumer perceptions of functional foods, relatively little is known about dieticians' responses to functional foods [36,37] and, in particular, how dieticians recommend functional foods to consumers.

Therefore, the purpose of this study was to investigate the relationship between dieticians' attitudes about functional foods and their recommendation intentions toward functional foods. Moreover, this study used the Structural Equation Model (SEM) to model how this relationship was mediated by consumption frequency of functional foods. In our research model, risk perception and response efficacy are internal antecedents, and consumption frequency is an external mediator in food recommendation behavior of functional foods.

Subjects and Methods

Definitions

The term *functional food* is a food product that, in addition to its basic nutritional value, contains nutrients or other substances that prevent or reduce the risk of a diet-related disease or enhances a certain physiological function (IOM/NAS, 1994).

Risk perception refers to how consumers feel about the wholesomeness of functional components and their uncertainty about the use of food technology to produce functional foods. Individual suspicion about possible harmful effects of functional foods eventually decreases consumer willingness to purchase those foods. *Response efficacy* refers to how consumers assess the benefits of functional food against the how well they expect functional foods to prevent disease and improve health. *Consumption frequency* refers to how many times consumers purchase functional foods and/or how frequently subjects purchase functional foods. *Recommendation intention* refers to how strongly consumers will recommend functional foods to others.

Research hypothesis

Figure 1 depicts the research model used in this study. This model facilitated the investigation of the mediator effect of consumption frequency between risk perception/response efficacy and the recommendation intention. The proposed model of functional food recommendation behavior can be summarized in the following hypotheses:

Hypothesis 1: Individuals with higher risk perception of functional foods will consume functional foods less frequently.

Hypothesis 2: Individuals with higher risk perception of functional foods will be less willing to recommend functional foods.

Hypothesis 3: Individuals with higher levels of response efficacy will consume functional foods more frequently.

Hypothesis 4: Individuals with higher levels of response efficacy will be more willing to recommend functional foods.

Hypothesis 5: Individuals with higher levels of consumption frequency of functional foods will be more willing to recommend functional foods.

Hypothesis 6: Consumption frequency of functional foods will mediate the risk perception path to recommendation intention.

Hypothesis 7: Consumption frequency of functional foods will mediate the response efficacy path to recommendation intention.

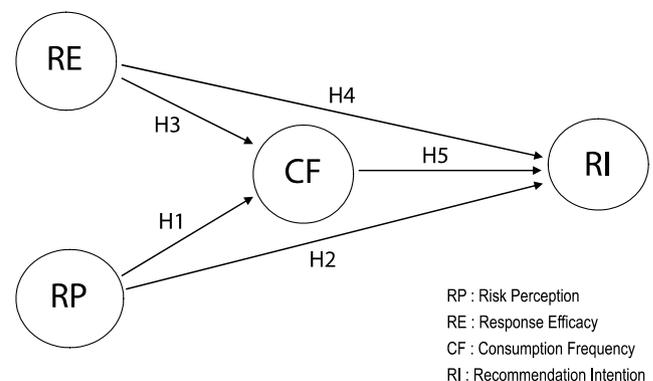


Fig. 1. The proposed functional foods recommendation model

Data collection

The data were collected from a web-based survey using self-administered questionnaires. The sample for this study is dietitians working in Daegu and Gyeongbuk, South Korea. Researchers sent an email about the survey, announcing the purpose of the study and encouraged dietitians to participate in the study before actually administering the survey. The online survey was conducted with the support of the Institute of Information and Computing Systems (IICS) of the research site during two weeks of March 2005. A reminder email was delivered through IICS to maintain confidentiality and anonymity. A total of 802 questionnaires were distributed, and 250 questionnaires were completed for a response rate of 30.4%. Of the 250 respondents who responded to the survey, 223 questionnaires were usable. Respondents were 98.6% female with a mean age of 34.53 years old with an age range of 24-52 years. Many (67.3%) respondents worked in an educational institution, 12.1% in private practice, 10.3% in healthcare facility, 2.2% in community facility, and 6.3% in others. The mean work experience of respondents was 9.26 years with a range of 1-25 years.

Survey instrument

The questionnaire was prefaced with a short, standardized definition of functional food. The questionnaire consisted of four constructs: Response efficacy, Risk perception, Consumption frequency, and Recommendation intention. Each construct was measured by multiple scales. Risk perception (RP) and Response efficacy (RE) were measured using 5 point Likert scale (1=strongly disagree; 5=strongly agree). Risk perception was measured as follows: 1) The safety of functional foods has not been very thoroughly studied; 2) If used in excess, functional foods can be harmful to health; 3) The stated health effects of functional foods are not based on thorough study; 4) The new properties of functional foods carry unforeseen risks; and 5) The standards of using functional foods are not clear. The response efficacy was measured as follows: 1) I can stay healthier when consuming functional foods; 2) I can avoid common health problems when eating functional foods; 3) Eating functional foods will ensure a long and healthy life; 4) Functional foods allow us to easily follow a healthy lifestyle; and 5) People are healthier when they consume more functional foods. Consumption frequency (CF) was measured using "How often do you purchase the following functional foods?: milk with added calcium and vitamin D, cholesterol-lowering margarines, green tea, soy-protein food product, omega-3 eggs, drink product with added fibre, probiotic yoghurt, chewing gum with xylitol, whole wheat breads, functional rice, and energy drinks." The respondents answered using a 5-point scale, consisting of "never," "seldom," "occasionally," "quite often," and "very often." Recommendation intention (RI) was measured by the following question: "I am planning to recommend functional foods that I have used in the past." The response was measured using a 5-point scale, ranging

from "very unlikely" to "very likely." Questions concerning socio-demographic information were also included.

Data analysis

The analysis was conducted using Structural Equation Modelling (SEM) [38]. SEM usually focuses on latent constructs that represent concepts not directly observable. The SEM model was tested in two stages; first, we examined the patterns of interrelationships among several constructs and evaluated their correspondence to data. Next, we analyzed the overall fit of the proposed model and then estimated all relevant path coefficients. The confirmatory factor analysis was performed to confirm the dimensionality of the constructs in the measurement model. The overall fit of the model was measured by the extent to which the covariance matrix implied by the hypothesized model differed from the sample covariance matrix. As a goodness-of-fit of the overall model, we evaluated the chi-squares test statistics, the Goodness of Fit Index (GFI), the Root Mean Square Error of Approximation (RMSEA), and the Comparative Fit Index (CFI) [39].

Results

Confirmatory factor analysis and validity of measurement

The confirmatory factor analysis was performed to validate constructs in the measurement model. All factor loadings were significant ($P < 0.05$), showing that the observed variables for each latent variable reflect a single underlying construct. The construct reliability and variance extracted were computed using indicator standardized loadings and measurement errors. All construct reliabilities exceed 0.70, and most variances extracted were higher than 0.50, from which we conclude that the constructs were reliable and valid. To assess internal reliability, we evaluated the Cronbach's alpha coefficient. This coefficient exceeded the 0.80 level, thus suggesting good reliability. More detailed results for the estimated factor loadings, construct reliabilities, variances extracted for each variable, and the values of Cronbach's alpha are shown in Table 1.

The proposed model was estimated by maximum likelihood estimation using AMOS 5.0.1 [38]. The goodness-of-fit indices of the proposed model are reported in Table 2. The fit of the proposed model turned out to be good: the value of chi-square was 227.352 with 196 degrees of freedom ($P = 0.062$). The GFI was 0.915, and CFI was 0.979. The RMSEA was 0.027, which is within the recommended level of 0.05.

Hypothesis testing

Table 3 shows the standardized coefficients associated with each path. The general structure of the structural model supports

Table 1. Standardized factor loadings and reliabilities of the constructs

The observed variables	Constructs		
	RP	RE	CF
RP 1	0.637 ^a		
RP 2	0.590		
RP 3	0.747		
RP 4	0.726		
RP 5	0.706		
RE 1		0.717 ^a	
RE 2		0.739	
RE 3		0.712	
RE 4		0.670	
RE 5		0.803	
CF 1			0.591 ^a
CF 2			0.484
CF 3			0.462
CF 4			0.555
CF 5			0.601
CF 6			0.501
CF 7			0.489
CF 8			0.461
CF 9			0.533
CF 10			0.635
CF 11			0.453
Construct reliability	0.879	0.892	0.796
Variance extracted	0.595	0.657	0.265
Cronbach's alpha	0.818	0.856	0.816

Notes: RP = Risk Perception, RE = Response Efficacy, and CF = Consumption Frequency

All estimated factor loadings are significant at $P < 0.05$.

^a Initially fixed at 1 for estimation

Table 2. Goodness of fit measures for the proposed model

	Recommended values	The proposed model
Chi-squares	$P > 0.05$	Chi-square = 227.352 Degrees of freedom = 196 $P = 0.062$
GFI	> 0.90	0.915
RMSEA	< 0.05	0.027
CFI	> 0.90	0.979

our main hypotheses. The estimates of the causal standardized path coefficients were significantly different from 0 ($P < 0.05$). We predicted that high risk perception of functional foods would decrease consumption frequency (H1). This prediction is supported by the data. The path between RP and CF is -0.197 ($t = -2.377$, $P < 0.05$). However, the negative relationship between RP and RI was -0.087 , which is very close to 0 and not significant (H2). We found a highly positive and significant relationship between RE and CF ($\beta = 0.348$, $t = 3.983$, $P < 0.001$) (H3). RE was also positively related to RI ($\beta = 0.410$, $t = 5.529$, $P < 0.001$) (H4). These results show that dieticians who believe the effects of functional foods are good, use functional foods frequently and have a strong intention to recommend functional foods to others. In addition, CF significantly affects RI with a positive path estimate of 0.242 ($t = 3.183$, $P < 0.01$) (H5).

Table 3. The results of hypotheses testing for the structural model

	Hypotheses	Standardized Estimate	t
H1	Risk Perception → Consumption Frequency	-0.197	-2.377*
H2	Risk Perception → Recommendation Intention	-0.087	-1.313
H3	Response Efficacy → Consumption Frequency	0.348	3.983***
H4	Response Efficacy → Recommendation Intention	0.410	5.529***
H5	Consumption Frequency → Recommendation Intention	0.242	3.183**

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

Table 4. Direct, indirect, and total effects in the structural model (standardized)

Relationships	Direct	Indirect	Total
RP → CF	-0.197	0.000	-0.197
RP → RI	-0.087	-0.047	-0.135
RE → CF	0.348	0.000	0.348
RE → RI	0.410	0.084	0.494
CF → RI	0.242	0.000	0.242

Table 4 presents the direct, indirect, and total standardized effects between latent variables. Mediation is demonstrated when the independent variable is statistically related to the mediator and when the mediator is statistically related to the dependent variable [40]. CF plays a statistically significant role as a mediator for the path between RP and RI (H6) and for the path between RE and RI (H7). In particular, because the path from RP to RI is no longer significant when CF has been controlled in the structural model, one knows that CF completely mediates the RP-RI relationship.

Discussion

The goal of the research was to assess whether the measurement model fit our dieticians' recommendation data and tested whether the structural model defined causal relations among the latent variables. This study proposed consumption frequency as a prominent variable for predicting subjects' behaviors by integrating attitudinal constructs (risk perception and response efficacy) and behavioral constructs (recommendation intention) and investigated the mediating role of consumption frequency on dieticians' recommendation behavior for functional foods.

Reliability and validity of measurement

We built a measurement model to analyze the dieticians' functional food recommendation behavior and we used a structural model to estimate the strength and direction of direct and indirect relationships between constructs. The confirmatory factor analysis was performed to validate constructs in the

measurement model. All construct reliabilities exceed 0.70, and most variances extracted were above 0.50, so we can conclude that the constructs were reliable and valid. We also evaluated Cronbach's alpha coefficient, which exceeded the 0.80 level, thus suggesting good reliability. The goodness-of-fit indices of the proposed model, which were evaluated by the maximum likelihood method, turned out to be good; therefore, our proposed model could be applicable to the other novel foods such as biotech food or irradiated food.

Relationships between attitudes and recommendation intention

The response efficacy directly and statistically significantly increased the recommendation intention for functional foods. A high score on this factor means that respondent perceives the recommendation of functional foods more favorably than the respondent whose score is low. The main focus in this factor is the belief that health can be improved with functional foods. The idea that eating functional food as a way to take care of oneself is a crucial in response efficacy. In the mechanism of functional food choice, response efficacy can be seen as one aspect of trust [6], efficacy [15], and reward perception [16,41]. [6] found that believing in the health effects of functional foods is the most crucial factor affecting, consumer acceptance, and [15] found that the perceived efficacy accounted well for the intention to consume functional foods. [16,41] indicated that the perceived reward from using functional foods best predicted the reported willingness to use functional foods.

Risk perception influenced consumption frequency directly and negatively as expected, whereas it had no significant direct influence on recommendation when consumption frequency was controlled. This evidence indicates that risk perception is insignificant in functional food acceptance among Korean dietitians. This negative aspect may be a broader concern of society in general rather than a personal issue affecting the individual behavior. The respondents seem to be aware that using of functional foods may have risks, but the possible risks do not affect the behavioral tendency, i.e., the evaluated intention to recommend functional foods. General suspicion about the functional food concept exists, but it may not influence the intention to recommend functional foods. In many studies, the risks and concerns about the use of functional foods have been highlighted [14,42,43], but according to this research, risk perception may not affect personal recommendation behavior. This finding agrees with the results in [16], where risk issues did not affect the willingness to use functional foods.

Relationships between consumption frequency and recommendation intention

Those dietitians who consumed functional foods frequently tended to recommend functional foods more favorably than dietitians who consumed functional foods less frequently.

According to the studies of [26,44,45], past behavior significantly improves the prediction of later behavior. This could mean that the behavior under consideration is at least habituated with past repeated performance. [46] explained that the predictive power of past behavior relies on the belief that past behavior was a reasoned action. The results in [17] showed that the frequency of fish consumption influenced the intention to eat fish, also supporting this study. Our findings confirm that there is a strong relationship between prior consumption behavior and later behavior (recommendation behavior in this study).

Mediating role of consumption frequency

Those who have high response efficacy revealed high consumption frequency, meaning that respondents who ate functional foods frequently have a more positive attitude towards functional food efficacy. Consumption frequency also had a significant positive effect on the intention to recommend functional foods. In previous studies, consumption frequency has usually been used as an indicator to categorize subjects [23,24,27] or dependent variables that were affected by predictors such as socio-economic, demographic, and psychological variables [18,30,31,32,46]. Our study found that consumption frequency mediated not only the relationship between risk perception and recommendation intention, but also the relationship between response efficacy and recommendation intention. These results are in accordance with earlier studies [17,26,28], which found that past behavior affected the prediction of the behavioral intention. In addition, our results suggest that, in the context of food choice, past consumption frequency may be incorporated into the food choice model and may significantly enhance the predictive power of food choice behavior.

Direct or indirect effects of consumption frequency on recommendation intentions would not always be desirable for dietitians in fulfilling their duties of collecting client information, evaluating clients' reasons to take functional foods, and advising clients to use functional food for optimal nutritional care. Therefore, dietitians should recommend functional food based on a body of scientifically sound information or evidence-based support in the context of healthful diet. When dietitians recommend the functional food based on their consumption frequency, they may provide misleading advice to consumers on the appropriate intake of functional foods. From a practical dietetic viewpoint, this finding makes it imperative that dietitians and nutrition students have scientific knowledge and evidence-based support for functional food use before they advise and educate consumers on how to integrate functional foods into their healthy eating plans. Therefore, for students, the curricula must be revised to reinforce functional foods content. At the same time, for the dietitians, scientific knowledge about functional food content must be provided via continuing education as well as research and opportunities to interact with their clients via research projects on functional foods.

Limitations and future research

Despite the important implications of this study, there are several limitations to the research. The findings need to be interpreted carefully and with awareness of the methodological details of the research. The results are not generalized to all dieticians in Korea, because this study only included dieticians in one southern province. Thus, future research in other provinces should be conducted to compare to the findings of this study. Future research would benefit from a national survey, collecting a representative sample of dieticians from several provinces, and addressing geographical differences. This study can be extended to other health professionals, such as doctors, nurses, or social workers, in a variety of health clinics. Differences and similarities between dieticians and other health professionals and their attitudes in the functional food recommendation model could be identified. Insight into this issue may be gained from further research using a qualitative research design.

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