



## Research report

## Food choice questionnaire revisited in four countries. Does it still measure the same?☆

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## ABSTRACT

This study focuses on the implementation of the food choice questionnaire (FCQ) across four countries. The first objective is to examine the degree to which the factor structure of the FCQ is invariant across different populations. The second objective is to analyse the motives for food choice in different countries. The cross-sectional sample of 1420 consumers consisted of Belgians ( $N = 458$ ), Hungarians ( $N = 401$ ), Romanians ( $N = 229$ ) and Filipinos ( $N = 332$ ). Data analyses included estimation of five multi-group confirmatory factor analysis models; calculation of mean importance ratings for each food choice factor across countries; ANOVA and Tukey post hoc tests; and a rank order test of most to least important factors within each country. The results confirm that the factorial structure of the FCQ is invariant with respect to factor configuration, factor loadings and item intercept. Sensory appeal is the most important factor among all European consumers, while health, convenience and price were all among the five most important factors shaping food choice in Belgium, Hungary and Romania. For Filipinos, the most important were health, price and mood. Sensory appeal ranked on the fourth place.

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## Introduction

Consumers are increasingly involved in the development of new products and services, and their food choice motives are gradually better understood. Improved knowledge and understanding of food choice motives can be beneficial for a wide diversity of decisions, ranging from more successful product development and market introductions in private businesses until the planning of more efficient public policies and interventions aimed at influencing healthier eating habits.

The food choice questionnaire (FCQ) is a tool to measure the motives underlying people's selection of food (Step toe, Pollard, & Wardle, 1995). It consists of 36 questions testing in a systematic way health-related and non-health related motives of food choice. The nine usually found factors appear as groups of statements related to health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity and ethical concern.

The FCQ has been successfully applied to many different populations, including British (Step toe et al., 1995), Finnish (Lindeman & Vaananen, 2000) and Uruguayan (Ares & Gambaro, 2007) consumers, for example. The FCQ was also implemented in

Belgium (Eertmans, Victoir, Vansant, & Van den Bergh, 2005). This study concluded that motives such as *sensory appeal* and *health* mediated the effect of food involvement on intake of specific food categories. Health was found the most important food choice motive among consumers in the Netherlands, herewith suggesting that healthy products appeal in particular to a majority of Dutch consumers (Lindeman & Vaananen, 2000).

A first cross-cultural study with the FCQ was undertaken in Asia (Prescott, Young, O'Neill, Yau, & Stevens, 2002). Consumers from Japan, Taiwan, Malaysia and New Zealand were tested for their food choice motives. The results demonstrated that different motives for food choice were strongly linked to nationality. Eertmans, Victoir, Notelaers, Vansant, and Van den Bergh (2006) assessed the degree of measurement invariance of the FCQ across Canada, Belgium and Italy. The findings of their study suggested that the FCQ factor structure might have different connotations across western urban populations. Following this cue, the FCQ was revised but the original questionnaire appeared to represent a more comprehensive and reliable research instrument allowing prediction of food selection behaviour (Fotopoulos, Krystallis, Vassallo, & Pagiaslis, 2009).

With an attempt to modify the FCQ, three more groups of items were added related to ecological welfare, political values and religion. However, all of them were usually rated as less important than many other food choice motives, such as health, sensory appeal or price (Lindeman & Vaananen, 2000).

Another cross-cultural study carried out in six European countries (Belgium, France, Italy, Norway, Spain and Poland) has

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used a reduced and adapted version of the FCQ for the purpose of the study, which concerned FCQ in the context of traditional food choice (Pieniak, Verbeke, Vanhonacker, Guerrero, & Hersleth, 2009). The adapted FCQ has been cross-culturally validated and the results showed that familiarity and natural content were positively, whereas convenience and health were negatively associated with traditional food choice.

An enhanced general food motivation model has also been implemented (Fotopoulos et al., 2009), including the original FCQ in Greece, while (Kornelis, Van Herpen, Van der Lans, & Aramyan, 2010) built upon the extended FCQ and used additional non-food information to the identification of food-choice segment membership in a large Dutch sample. Both studies concluded that tailor-made marketing strategies are recommended based on the high predictive ability of the FCQ.

Initial analyses of the cross-cultural validity of the FCQ came to positive conclusions. Measurement invariance is an important indicator of cross-cultural validity. It is defined as “whether or not, under different conditions of observing and studying a phenomenon, measurement operations yield measures of the same attribute (p. 117)” (Horn & Mcardle, 1992). It might be understood as a degree of similarity in terms of measurement properties of the survey instrument across different populations under study. In a cross-cultural or cross-country data set, direct comparison of concept means as well as the nature and strength of observed relations between the investigated constructs, is only meaningful if the measurement invariance is established. If measurement invariance is not obtained or if there is no evidence of performing such an analysis, then results between different populations cannot be interpreted (Horn & Mcardle, 1992) as they may lead to erroneous conclusions.

Measurement invariance is typically assessed through a multi-step process. A stepwise multi-group confirmatory factor analysis was proposed (Steenkamp & Baumgartner, 1998) that distinguishes six levels of measurement invariance within a framework. Configural invariance assesses whether the number of constructs and observed variables associated with each construct are the same across the groups (Horn & Mcardle, 1992; Meredith, 1993). It implies that participants belonging to different populations conceptualise constructs in the same way. Metric invariance implies whether the observed variables are measured according to the same scale units across groups. Scalar invariance implies that the observed variables are measured according to the same scale units and scale locations, i.e. on common interval scales. Scalar invariance is required if the researcher is interested in meaningful comparisons of observed means across different populations (Little, 1997; Meredith, 1993). Factor covariance invariance implies that interrelationships among the underlying constructs are the same across populations. Factor variance invariance indicates that the underlying constructs have the same variability across groups. Error variance invariance indicates that item reliabilities (and therefore, also the scale reliabilities) are the same across the samples. Finally, identity implies that the means of the underlying constructs are the same across the populations.

The aim of the present study is twofold. Firstly, this study aims to examine the degree to which the factor structure of the FCQ is invariant across different populations. Secondly, we investigate what are the motives for food choice in different countries. To the authors' knowledge, this is the first study applying and comparing the FCQ across Romania, Hungary, the Philippines and Belgium. Previous research investigating measurement invariance in western urban populations recommended further studies replicating original study (Steptoe et al., 1995), providing robust tests of the scalar invariance of the FCQ (Eertmans et al., 2006).

## Materials and methods

### Participants

Questionnaires were completed by consumers in Belgium, Hungary and Romania in 2009, and in the Philippines in 2008. The choice of the countries was determined by the fact that two doctoral research projects were executed in Belgium, Hungary and Romania. The survey in the Philippines took place in the frame of the inter-university cooperation project.

The total sample of 1420 consumers included 909 females and 511 males representing Belgians ( $N = 458$ ), Hungarians ( $N = 401$ ), Romanians ( $N = 229$ ) and Filipinos ( $N = 332$ ) (Table 1). Filipino respondents were on average younger than European consumers. The majority of Romanians and Hungarians held either basic or high school certificates. A substantial number of participants were observed with high body mass index (BMI) among Romanians and Hungarians.

### Questionnaire and data collection

The questionnaire assessed socio-demographics (gender, age and education), weight and height (for calculating BMI), and the 39 items of the FCQ (Steptoe et al., 1995), which were answered on a seven-point interval scale ranging from ‘not important at all’ (1) to ‘extremely important’ (7). The questions were related to food in general that is consumed on a typical day. Consumers were presented with the questionnaires on a computer screen while seated in either sensory booths or IT rooms at two universities in Belgium and the Philippines, and Campden BRI sensory laboratory in Hungary. The Romanian consumers completed the questionnaires while seated at a temporary test location.

### Data analysis

In line with the first objective of our study, five multi-group confirmatory factor analysis models were estimated (one for each country) following the procedure recommended by Steenkamp and Baumgartner (1998), and using the robust maximum likelihood procedure in LISREL 8.72. Next, a maximum likelihood confirmatory factor analysis on the pooled sample was performed. To evaluate the model fit, the  $\chi^2$ -value together with degrees of freedom will be reported, as well as three other indices: the root mean square error of approximation (RMSEA), the goodness of fit index (GFI) and the comparative fit index (CFI). Values below 0.08 for RMSEA (Browne & Cudeck, 1993) and above 0.90 for GFI and CFI (Bollen, 1989) indicate an acceptable fit.

**Table 1**

Description of the sample in Belgium, the Philippines, Romania and Hungary.

Total sample	Belgium n=458	Philippines n=332	Romania n=229	Hungary n=401
Gender (%)				
Female	60.0	71.4	65.9	61.5
Male	40.0	28.6	34.0	38.5
Education (%)				
Basic or high school	15.9	3.6	74.3	65.5
Higher education or university	84.1	96.4	25.8	34.5
BMI (%)				
Underweight (<18.5 kg/m <sup>2</sup> )	6.6	18.1	6.1	3.0
Normal (18.6–24.9 kg/m <sup>2</sup> )	64.4	70.5	54.1	55.5
Overweight (25–29.9 kg/m <sup>2</sup> )	22.7	6.6	31.0	29.5
Obese (>30 kg/m <sup>2</sup> )	6.3	4.8	8.7	12.0
Age				
Mean (years)	28	21	40	40
Above 30 years old (%)	54	30	62	62

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