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What determines fresh fish consumption in Croatia?

Tomić, Marina¹; Matulić, Daniel^{2*}; Jelić, Margareta,³

¹Department of Marketing in Agriculture, University of Zagreb, Faculty of Agriculture, Zagreb, Croatia, matomic@agr.hr

²Department of Fisheries, Beekeeping, Game Management and Special Zoology, University of Zagreb, Faculty of Agriculture, Zagreb, Croatia, dmatulic@agr.hr

³Department of Psychology, University of Zagreb, Faculty of Humanities and Social Sciences, Zagreb, Croatia, mjelic@ffzg.hr

**Corresponding author*



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Abstract

Although Croatia is a Mediterranean country, the average annual fish consumption is only 8–10 kg per capita, as opposed to the European average of 20 kg per capita. The aim of this study was to determine the factors influencing fresh fish consumption in Croatia using an expanded Theory of Planned Behaviour (Ajzen, 1991) as a theoretical framework. The survey was conducted on a heterogeneous sample of 1151 Croatian fresh fish consumers. The study investigated the relationship between attitudes, perceived behavioural control, subjective norm, moral obligation, involvement in health, availability, intention and consumption of fresh fish. Structural Equation Modeling by Partial Least Squares was used to analyze the collected data. The results indicated that attitudes are the strongest positive predictor of the intention to consume fresh fish. Other significant predictors of the intention to consume fresh fish were perceived behavioural control, subjective norm, health involvement and moral obligation, whereas no significant impact of availability on intention was found. The intention to consume fresh fish showed a strong positive correlation with behaviour. This survey provides valuable information for food marketing professionals and for the food industry in general.

Keywords: Fresh fish, Theory of Planned Behaviour, Consumers, Partial Least Squares
Topic: Models of food consumption behaviour and their predictive power

Introduction

Consumer habits have changed significantly in recent decades, and food issues such as indulgence, convenience, health, ethics, variety, value for money, and safety are becoming increasingly important. Health and well-being are increasingly influencing consumption decisions, and fish has a particular prominence in this respect, as mounting evidence confirms the health benefits of eating fish (FAO, 2014).

Seafood, particularly fresh fish, is a widely available and nutrient-rich food source (IOM, 2007) that is recommended due to multiple nutritional benefits (ISSFAL, 2004; AHO, 2014). Fish is high in protein and low in saturated fats and contains a number of other healthy nutrients, such as vitamin D, selenium, and iodine. In particular, fish is the primary dietary source of n-3 long chain polyunsaturated fatty acids, including docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) (Oken *et al.*, 2012), which are well known for their anti-inflammatory effect (Wall *et al.*, 2010) and their protective role against chronic disease (Cole *et al.*, 2010). Consumption of fresh fish has a positive impact on human health when included at least twice a week in a normal diet (Mozaffarian & Rimm, 2006; Sioen *et al.*, 2007a). Burger & Gochfeld (2009) indicated that consumers today are aware of the health benefits of consuming fish. However, despite the predominantly healthy image of fish as a food product and the favourable consumer attitudes towards eating fish (Trondsen *et al.*, 2004b), fresh fish consumption remains below the recommended intake levels among the majority of European consumers (Welch *et al.*, 2002). Although the average European fish consumption is around 20 kg (per capita per year) (FAO, 2011), there is great variation among countries, i.e., Portugal 61.6 kg, Spain 44.8 kg and France 34.2 kg (FAO, 2008). This occurs due to differences in the quantity and frequency of consumed fish among regions and countries, which reflects differences in the availability of fish and other foods, and the heterogeneity of consumer preferences (Welch *et al.*, 2002). Understanding the importance of factors related to fresh fish consumption enables food marketers to improve promotional communication, perception and distribution of products at the local level (Trondsen *et al.*, 2004a). In Belgium, where fish consumption remains below the recommendations at around 25.9 kg per capita per year, Verbeke & Vackier (2005) suggested that a more positive attitude towards eating fish and higher social pressure could yield a stronger intent to eat fish. Birch & Lawley (2010) and Sioen *et al.* (2007b) identified taste, convenience, diet variety and health benefits as the key drivers for seafood consumption in Australia. Also, price was the most frequently reported barrier for finfish consumption among older Australians (≥ 51 years of age) (Grieger *et al.*,

2012). On the other hand, Leek *et al.* (2000) suggest that individuals may be averse to consuming fish because of a perceived difficulty in buying, preparing and cooking fish, the belief that it is expensive, or the unpleasant physical properties of some varieties of fish, such as small bones and the smell. In Spain and Belgium, Brunsø *et al.* (2009) indicated that health and taste are the main motives for eating fish, while the main barriers were price perception, smell when cooking fish, and perception of consumers that fish does not deliver the same level of satiety as compared to meat. The perceived barriers for increased fish consumption in a random sample of Norwegian women aged 45–69 were the lack of available fresh fish, poor quality, and high price (Trondsen *et al.*, 2003). Examining the attitudinal determinants of fish consumption in Spain and Poland, Pérez-Cueto *et al.* (2011) determined more positive attitudes towards fish in Poland than in Spain. It seems that determinants of fish consumption may vary across different countries and that more research is needed to shed light on the underlying factors of fish consumption. In the same vein, recent studies indicate temporal changes in fish consumption. Specifically, in the same study, increased levels of knowledge about fish were observed in the period 2008–2011. In Spain, more people reported choosing fish when eating out in 2008 compared with respondents in 2004. Such a trend suggests that people are slowly moving towards healthier choices even when dining out of the home.

Although Croatia is a Mediterranean country and fresh fish should be widely available, fresh fish consumption is very low (8–10 kg per capita per year; CBS, 2012) in comparison with other Mediterranean countries, especially Portugal and Spain. To our knowledge, no research has been conducted in any Mediterranean countries on the determinants of fresh fish consumption using an extended Theory of Planned Behaviour (TPB). Existing data on the determinants of fish consumption using TPB have primarily been collected in northern European countries. Thus, the underlying factors remain unclear and more research is needed to determine the key drivers and barriers to fish consumption, and the causes of differences between Croatia and other Mediterranean countries, such as Italy or Greece.

The primary objective of this study was to investigate intention and behaviour in fresh fish consumption among Croatian consumers using the TPB as a theoretical framework. The second objective was to examine the influence of additional constructs (moral obligation, health involvement and availability) on intention. The third objective was to test the predictive utility of the extended TPB model on intention and fresh fish consumption through SEM analysis.

The research hypothesis and proposed model are described in the following section, Theoretical framework. The Methodology section presents the questionnaire, data collection

and analysis. The results are shown in the Results section, while the final section of the paper offers discussion, strengths and limitations.

Theoretical framework

Theory of Planned Behaviour

A number of theoretical models have been used to predict health behaviours. One of the most dominant and commonly used models is the Theory of Planned Behaviour (TPB; Ajzen, 1991). This is a very powerful and predictive model for explaining human behaviour that has been well supported by empirical evidence and as such has become the most popular base for empirical studies and for implementing various interventions. TPB is basically an extension of the Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975) that was grounded in various theories of attitudes. While TRA emphasizes one key determinant of behaviour, i.e. the intention to engage in that behaviour, TPB posits that behavioural achievement depends on both motivation (behavioural intention) and ability (behavioural control) to perform the behaviour in question. According to TPB, human behaviour is determined by three independent predictors: attitudes, subjective norm, and perceived behavioural control. Attitude toward the behaviour refers to the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question. Subjective norm refers to the perceived social pressure to perform or not to perform the behaviour, while perceived behavioural control (PBC) refers to the perceived ease or difficulty of performing the behaviour, and it is assumed to reflect past experience as well as anticipated impediments and obstacles (Ajzen, 1991). The more positive the attitude toward the behaviour, the greater the subjective norm and perceived behavioural control with regard to the behaviour in question, the stronger the individual's intention will be to perform such a behaviour. It should be noted that the theory posits and research confirm that PBC independently predicts both intention and behaviour in wide number of domains (Armitage & Conner, 2001). According to Ajzen (1991) and Perugini & Bagozzi (2001), modifying the TPB model by altering paths and including additional critical constructs in a certain context often contribute to enhancing our understanding of the theoretical mechanism of the model. This increases the prediction power for the individuals' intention/behaviour in that specific context, and the theory can be broadened and deepened through such a process (Ajzen, 1991; Perugini and Bagozzi, 2001). Many studies have confirmed that TPB has improved the predictability of intention for a wide range of behaviours in various health-related fields. Furthermore, TPB is recognized as one of

the most predictive persuasion theories. A meta-analysis of 185 independent studies (Armitage & Conner, 2001) suggested that TPB is capable of explaining 20% of the variance of actual behaviour (medium to large size effect), and this number is even higher for self-reported behaviours. TPB has also been shown to be relatively strong in predicting seafood consumption (Bredahl & Grunert, 1997; Verbeke and Vackier, 2005). Specifically, Verbeke & Vackier (2005) found that TPB with habit as a separate construct predicted 52% of the variance in the intention to eat seafood. TPB variables significantly predicted fresh fish consumption in a sample of Danish consumers (n=800) (Bredahl & Grunert, 1997). According to Thong & Olsen (2008), 23% of the variation of fish consumption frequency was significantly explained by intention and perceived behavioural control.

Research hypothesis

Consumer attitudes towards food and nutrition have been found to be important factors influencing food consumption behaviour in general (Hearty *et al.*, 2007), and fish consumption behaviour in particular (Verbeke *et al.*, 2005). Olsen (2001) found a significant effect of positive and negative components of attitude on intention, which was measured as the involvement of seafood as a family meal in Norway. Expectedly, positive attitudes had a positive correlation with intention, while negative attitudes had a negative regression coefficient. Based on the above, the hypothesis is:

H1. Positive attitudes have a positive impact on the behavioural intention to eat fresh fish

Olsen (2001) found a significant effect of subjective norms on the intention to consume fish in Norway. Furthermore, advertising campaigns designed to lower the adverse impacts of availability and meal preparation skills in Denmark indicated that the social norm from family members contributed significantly to the intention to eat fish in the post-campaign period (Scholderer & Grunert, 2001). A report from Belgium indicated that each individual family member has a strong impact on the food choice of the family, which leads to adjusting food habits in correspondence with family member expectations (De Bourdeaudhuij & Van Oost, 1998). Rozin (1995) found that social factors are more liable to form individual food preference than genetic factors. According to Verbeke & Vackier (2005), the social pressure to consume fish finds its origin in direct social environments, such as family and friends. Hence, the proposed hypothesis is:

H2. Subjective norms to eat fish have a positive impact on the behavioural intention to eat fresh fish

According to Armitage & Conner (2001), PBC influences intention. Verbeke & Vackier (2005) investigated the individual determinants of fish consumption behaviour based on cross-sectional data collected in Belgium. They found significant correlations between all items of PBC and intention to consume fish. TPB was a relevant model for explaining consumer behaviour in relation to fish and shellfish in a study conducted by Bredahl & Grunert (1997) in Denmark, where they found that seafood consumption could be explained through three constructs: attitudes, perceived social pressure and perceived behavioural control. Therefore, the following hypothesis is proposed:

H3. Perceived behavioural control has a positive impact on the behavioural intention to eat fresh fish

Health involvement is one of the strongest drivers in seafood consumption (Olsen, 2004). Altintzoglou *et al.* (2011) stressed a positive association of involvement in health issues and attitudes towards fish consumption with fish consumption as the main outcome of their study in Belgium. Mitterer-Daltoé *et al.* (2013) found a strong correlation between the constructs of “health” and “weight control” as a predictor of the intention to eat fish in Rio Grande, Brazil. Trondsen *et al.*, (2004b) indicated that a generally healthy food consumption pattern was strongly associated with weekly fish consumption. Higher fish consumption was associated with increasing consumer beliefs and behaviours of that food’s importance to health, high fish consumption in childhood and a higher level of education and income. Currently, the positive consumer perception of fish regarding its healthiness and nutritional value seem to be so strong that it could not be further increased by exposing consumers to messages stressing the health benefits of fish consumption (Pieniak *et al.*, 2010; Verbeke *et al.*, 2008). As a result the proposed hypothesis is:

H4. Health involvement has a positive impact on the behavioural intention to eat fresh fish

Examples of moral obligation that significantly improve the prediction of behavioural intentions can be found in Schwartz & Tessler (1972), Pomazal & Jaccard (1976), Gorsuch & Ortberg's (1983); and Raats *et al.* (1995).

Olsen (2001) studied consumer involvement in making seafood a family meal in Norway and found that moral obligation was positively correlated with intention. Also, moral obligation and negative feelings towards seafood were more important determinants than general attitudes and social norms in explaining the variations in interest and involvement in making seafood the common family meal. Olsen (2004) concluded that seafood consumption was less driven by taste and preferences, and more by moral obligation, as compared to other food

products. According to Leek *et al.* (2000), the moral obligation of a person to ensure household members have a healthy and nutritious meal can induce the entire family to consume a healthy diet, including fish. A high personal feeling of responsibility to offer the family a meal including fish was confirmed in study of Verbeke & Vackier (2005). Therefore, the following hypothesis is proposed:

H5. Moral obligation has a positive impact on the behavioural intention to eat fresh fish

Among many other interrelating factors, food consumption behaviour is also influenced by environmental characteristics such as availability, season, situation and culture (Olsen, 2004). Scholderer & Grunert (2001) indicated a significant impact of the availability of fresh fish on consumption frequency in their study, while Thong & Olsen (2008) indicated fish availability as a significant indicator of perceived control over fish consumption. Verbeke & Vackier (2005) indicated the availability of fish and the ease of preparing fish as the most significant variables of perceived behavioural control. The proposed hypothesis is:

H6. Availability of fresh fish has a positive impact on the behavioural intention to eat fresh fish

The results on the consumption of fresh fish in Vietnam showed that the intention to consume fresh fish was a significant predictor of consumption of fresh fish (Thong & Olsen, 2008). Also, Scholderer & Grunert (2001) indicated a significant impact of availability in shops, meal preparation skills and intention to buy fish on consumption frequency in their study prior to an advertising campaign in Denmark. Following the campaign, only the intention to buy fish was a significant determinant of consumption frequency. According to Verbeke & Vackier (2005), intention and perceived behavioural control are two significant determinants of fish consumption frequency. Based on this evidence, the final hypothesis is as follows:

H7. Intention to eat fresh fish and perceived behavioural control have a positive influence on behaviour, namely the frequency of fresh fish consumption

TPB Model for fresh fish consumption

From the above hypotheses, the relationship among the variables can be described as shown in the model in Figure 1. The model includes the original variables in the TPB and added constructs (moral obligation, health involvement and availability). The dashed lines indicate the new paths added to the original TPB model.

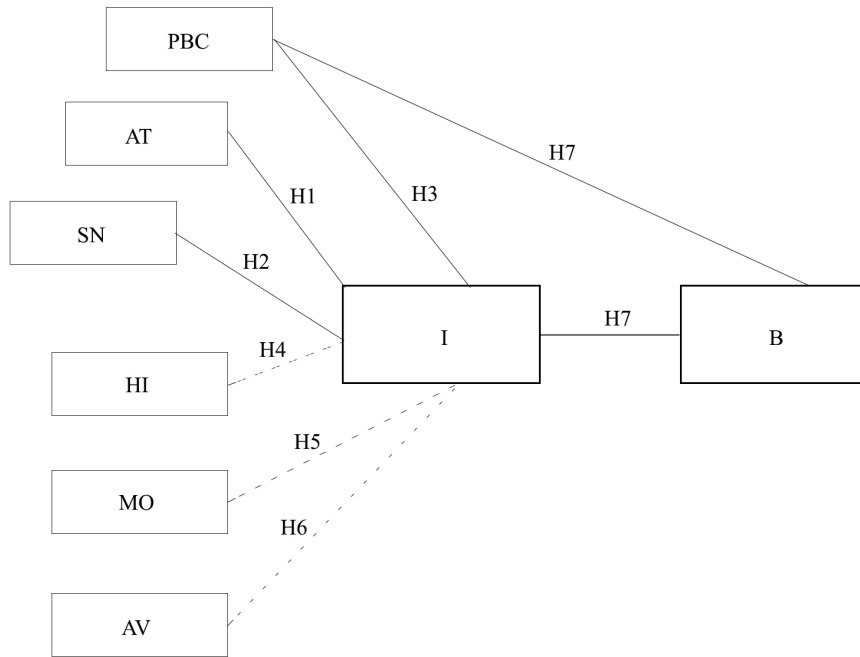


Figure 1. Proposed TPB Model for fresh fish consumption

Notes: AT=Attitudes, SN= Subjective norm, PBC= Perceived behavioural control, MO= Moral obligation, HI= Health involvement, AV= Availability, I= Intention, B= Behaviour

Methodology

Questionnaire and Measurement scale

Construct measures for attitudes, subjective norm, perceived behavioural control, moral obligation, involvement in health, availability, intention and behaviour were based on the existing measures from the literature (Birch & Lawley, 2010; Altintzoglou *et al.*, 2011; Verbeke *et al.*, 2007; Verbeke & Vackier, 2005; Arvanitoyannis *et al.*, 2004; Myrland *et al.*, 2000; Bredahl & Grunert, 1997). The measures were slightly modified for use in a questionnaire adapted for fresh fish consumption. Frequency of fresh fish consumption in the last month (behaviour) was assessed using 6 frequency categories (“How many times have you consumed fresh fish in the past month?”: 0 = I did not eat fresh fish in the past month, 1 = 1 time, 2 = 2–3 times, 3 = 4–5 times, 4 = 6–7 times, 5 = >7 times). Other study constructs were assessed using the 5-point Likert scale, with responses ranging from strongly disagree (1) to strongly agree (5). A five-item scale was used for measures of attitudes (e.g., “Eating fresh fish is healthy”) with higher results indicating more positive attitudes towards eating fresh fish. In addition, multi-item scales were used to assess subjective norm (4 items) (e.g., “My family thinks I should eat fresh fish”). Higher values indicated a higher perceived social pressure to eat fresh fish. Perceived behavioural control was measured with three items (e.g.,

“I find it difficult to assess the quality and freshness of fish”). Items for PBC were reverse coded prior to final data analysis. Higher levels indicated higher perceived behavioural control. A two-item scale was used for measures of intention (e.g., “I intend to eat fresh fish in the next two weeks”). The higher the level indicated the higher the intention to eat fresh fish. Three items were used to measure moral obligation (e.g., “I prepare dishes with fresh fish to give my family a healthy meal”), with higher values indicating a higher moral obligation to prepare fresh fish meals. Involvement in health was assessed using three items (e.g., “I care a lot about health”), where higher scores indicated more health involvement. Three items were used to assess availability (e.g., “The limited supply of fresh fish prevents me from eating fresh fish as much as I would like”). Items for moral obligation were also reverse coded. Higher values of availability indicated higher availability of fresh fish.

Data collection

An on-line survey (90% of respondents) and face-to-face survey (10% of respondents) was used to collect data. For on-line survey, snowball sampling was used, while a convenience sample was used for face-to-face survey. The time needed to complete the questionnaire was 5–7 minutes. In the opening instructions of the survey, a detailed description of the term fresh fish was provided: *Fresh fish is whole fish that has never been frozen, from catch to market to consumer, it has only been kept chilled until it comes to market* (Avery, 2009). Since the objective was to determine the factors that influence the frequency of fresh fish consumption, only those respondents who eat fresh fish could complete the questionnaire. A total of 1986 responses were received from survey participants. However, 483 respondents were excluded from further analysis because of incomplete questionnaires, while 352 respondents did not consume fresh fish. The final analysis was conducted on a sample of 1151 respondents who were fresh fish consumers.

Sample

The sample contained 69.5% females and 30.5% males. The age of the participants varied from 18–60 years, though the majority of respondents (46%) were relatively young (18–29 years old) and only 15% were older than 45 years. The majority of respondents (76.6%) had an academic degree. Most respondents had an average income (71.2%) while 11% had a below average income and 18% an above average income. The majority of respondents lived with 3–5 household members (69%), and had residence in predominantly urban parts of Croatia (81.4%). Although the sample was heterogeneous according to sociodemographic

characteristics, it was somewhat biased in terms of younger respondents (predominantly females) with higher education and predominantly urban residence.

Data analysis

Data were analysed using SPSS, version 17. Principal components factor analysis with Varimax rotation and Kaiser normalisation was used to ensure that the key constructs were separate factors. Relationships among the variables were analysed using the multivariate analysis technique Partial Least Square - Structural Equation Modeling (PLS-SEM). PLS can be utilized to confirm theory, as in this case, and to explain very complex relationships (Chin *et al.*, 1996). For the analysis of data using PLS, the SmartPLS v.2 M3 software was used.

Results

Factor analysis

Factor analysis was used to explore whether TPB constructs were distinct. Using Maximum likelihood analysis, eight factors emerged and together accounted for 63.02% of the variance in items. With Promax rotation, items for the constructs of attitudes, subjective norm, perceived behavioural control, health involvement, moral obligation, availability, intention and behaviour represented distinct factors (see Table 1).

Items	Component							
	1	2	3	4	5	6	7	8
Attitude 1	0.857							
Attitude 2	0.613							
Attitude 3	0.777							
Attitude 4	0.791							
Attitude 5	0.805							
Subjective norm 1					0.568			
Subjective norm 2					0.763			
Subjective norm 3					0.521			
Subjective norm 4					0.567			
PBC 1							0.731	
PBC 2							0.621	
PBC 3							0.910	
Intention 1						0.936		
Intention 2						0.904		
Health involvement 1				0.967				
Health involvement 2				0.772				
Health involvement 3				0.605				
Availability 1			0.785					
Availability 2			0.927					
Availability 3			0.787					
Moral obligation 1		0.968						
Moral obligation 2		0.937						
Moral obligation 3		0.924						
Behaviour								0.388

Table 1. Factor Analysis

Notes: PBC=perceived behavioural control

Descriptive analysis

The TPB constructs are presented in Table 2. Respondents had positive attitudes towards fresh fish consumption, high health involvement and high intention to consume fresh fish in the next two weeks. However, respondent perceptions were moderate for the availability of fresh fish, positive subjective norm and perceived behavioural control. Furthermore respondents expressed a low moral obligation to prepare fresh fish meals and a low frequency of fresh fish consumption. The findings suggested that 90% of respondents eat fresh fish less than once a week. Even more alarming is the finding that some 30% of Croats eat fresh fish only once a month or even less frequently.

	N	Min	Max	Mean	Standard deviation
Attitudes	1151	5	25	22.38	3.13
Subjective norm	1151	4	20	14.22	2.73
Perceived behavioural control	1151	3	15	8.98	2.42
Intention	1151	2	10	8.18	1.74
Health involvement	1151	3	15	12.39	1.85
Availability	1151	3	15	9.11	2.83
Moral obligation	1151	3	15	6.70	2.27
Behaviour	1151	0	5	2.12	1.22

Table 2. Descriptive statistics

Correlation matrix of the TPB constructs

The Pearson product correlation matrix of the study variables is presented in Table 3. As expected, attitudes towards fresh fish consumption were highly positively correlated with intention ($r_{AT-I}=0.544$). Moderate but positive correlations were also found between the intention to consume fish and the subjective norm ($r_{SN-I}=0.390$) and health involvement ($r_{HI-I}=0.314$). Additionally, the intention to eat fish was also positively correlated with perceived behavioural control ($r_{PBC-I}=0.261$) and moral obligation ($r_{MO-I}=0.273$). Interestingly, the availability of fresh fish was not significantly correlated with the intention to consume it, though low but significant correlations were found between availability and perceived behavioural control, health involvement and behaviour ($p<0.01$). All the constructs had a positive and significant correlation with behaviour ($p<0.01$). The remaining interrelationships between the variables are listed in Table 3.

	AT	AV	PBC	HI	MO	SN	I	B
AT	1	-0.078**	0.205**	0.300**	0.195**	0.310**	0.544**	0.219**
AV		1	0.230**	-0.078**	-0.024	0.032	-0.035	0.117**
PBC			1	0.096**	0.118**	0.163**	0.261**	0.291**
HI				1	0.290**	0.300**	0.314**	0.157**
MO					1	0.248**	0.273**	0.110**
SN						1	0.390**	0.363**
I							1	0.438**
B								1

Table 3. Correlation matrix

Notes: AT=Attitudes, SN= Subjective norm, PBC= Perceived behavioural control, MO= Moral obligation, HI= Health involvement, AV= Availability, I= Intention, B= Behaviour

* $p < 0.05$ ** $p < 0.01$

Reliability and validity

In terms of reliability, each construct in the model must achieve a minimum reliability score of 0.7 (Kwong & Wong, 2013). Although Cronbach alpha can also be used to assess internal consistency, composite reliability (CR) is recommended for PLS models (Fornell & Larcker, 1981). The highest level of reliability in the model was found between moral obligation and intention. The lowest reliability was achieved by the construct of perceived behavioural control. Convergent validity is carried out using the Average Variance Extracted (AVE) test on the model variables. Value of the average variance extracted (AVE) for each of the constructs should be a minimum of 0.5 (Bagozzi & Yi, 1988). The construct of moral obligation had the highest AVE level, while subjective norm had the lowest. Since the composite reliability scores for all model variables were greater than 0.7 and the AVE scores were greater than 0.5, reliability and validity for all constructs were satisfactory (Table 4).

Model variables	CR	AVE
Attitudes	0.910	0.670
Subjective norm	0.809	0.519
Perceived behavioural control	0.797	0.570
Health involvement	0.893	0.738
Availability	0.896	0.744
Moral obligation	0.975	0.929
Intention	0.957	0.918
Behaviour	1.000	1.000

Table 4. Reliability and validity

Notes: CR=Composite Reliability, AVE= Average variance extracted

The final criterion of the model validity was discriminant validity, which requires that the square root of AVE for each latent variable should be greater than the cross-correlations between those latent variables (Fornell & Larcker, 1981). In terms of discriminant validity, the model was also found to be valid (Table 5).

	AV	HI	MO	I	PBC	B	SN	AT
AV	0,863							
HI	-0,081	0,859						
MO	-0,020	0,307	0,964					
I	-0,053	0,331	0,293	0,958				
PBC	0,204	0,077	0,150	0,228	0,755			
B	0,099	0,149	0,121	0,438	0,289	1,000		
SN	0,012	0,311	0,255	0,423	0,183	0,401	0,720	
AT	-0,093	0,323	0,212	0,543	0,158	0,219	0,328	0,819

Table 5. Discriminant validity

Notes: AT=Attitudes, SN= Subjective norm, PBC= Perceived behavioural control, MO= Moral obligation, HI= Health involvement, AV= Availability, I= Intention, B= Behaviour

Assessment of TPB model of fresh fish consumption

The model of fresh fish consumption resulted in a high impact of attitudes on the intention to consume fresh fish. Attitudes towards fresh fish consumption directly and positively affected the intention to consume fresh fish ($\beta_{AT-I} = 0.399$; $t = 11.413$; $p < 0.05$), thus supporting hypothesis 1. These findings are consistent with previous studies (Verbeke *et al.*, 2005; Olsen, 2001; Bredahl & Grunert, 1997), implying that an increase in favourable attitudes will result in an increase in the intention of fresh fish consumption. Among other predictors of intention to consume fresh fish, subjective norms ($\beta_{SN-I} = 0.216$; $t = 7.265$; $p < 0.05$) and perceived behavioural control ($\beta_{PBC-I} = 0.108$; $t = 4.671$; $p < 0.05$) also showed a positive and direct impact on intention, thus supporting hypotheses 2 and 3. These results are in line with previous studies (Scholderer & Grunert, 2001; De Bourdeaudhuij & Van Oost, 1998; Verbeke & Vackier, 2005). The intention to consume fresh fish was associated with consumers' perceived pressure from family members and friends. Also, the greater their perceived behavioural control, the more likely consumers will intend to eat fresh fish. Although health involvement had the lowest positive impact of the predictors of intention, the impact was significant ($\beta_{HI-I} = 0.091$; $t = 3.308$; $p < 0.05$), thus supporting hypothesis 4. This finding also corroborates the results of previous studies (Olsen, 2004; Mitterer-Daltoé *et al.*, 2013).

As expected, moral obligation was found to be a significant predictor of intention ($\beta_{MO-I} = 0.108$; $t = 4.384$; $p < 0.05$). Consumers who feel a stronger moral obligation to prepare fresh

fish meals also have a stronger intention to eat fresh fish. Therefore, hypothesis 5 was supported, which is consistent with previous studies (Leek *et al.*, 2000; Olsen, 2004; Verbeke & Vackier, 2005). The findings indicated that availability was negatively though insignificantly associated with intention ($\beta_{AV-I} = -0.031$; $t = 1.083$; $p > 0.05$), thus rejecting hypothesis 6. These results are contrary to the results of Verbeke & Vackier (2005). Intention ($\beta_{I-B} = 0.393$; $t = 15.590$; $p < 0.05$) and perceived behavioural control ($\beta_{PBC-B} = 0.200$; $t = 8.017$; $p < 0.05$) were also found to be positively and significantly associated with behaviour, thus supporting hypothesis 7. This result indicates that as intention and perceived behavioural control increase, so does the frequency of fresh fish consumption. This finding also supports previous studies (Verbeke & Vackier, 2005). The extended TPB model explained about 39% of the total variance in the intention of fresh fish consumption, and about 23% of the total variance in behaviour (fresh fish consumption) (Figure 2). According to Falk & Miller (1992), the lowest recommended level for the percentage of explained variance is 10%. Overall, the results of the model evaluations implied that the proposed TPB model well predicted intention and fresh fish consumption.

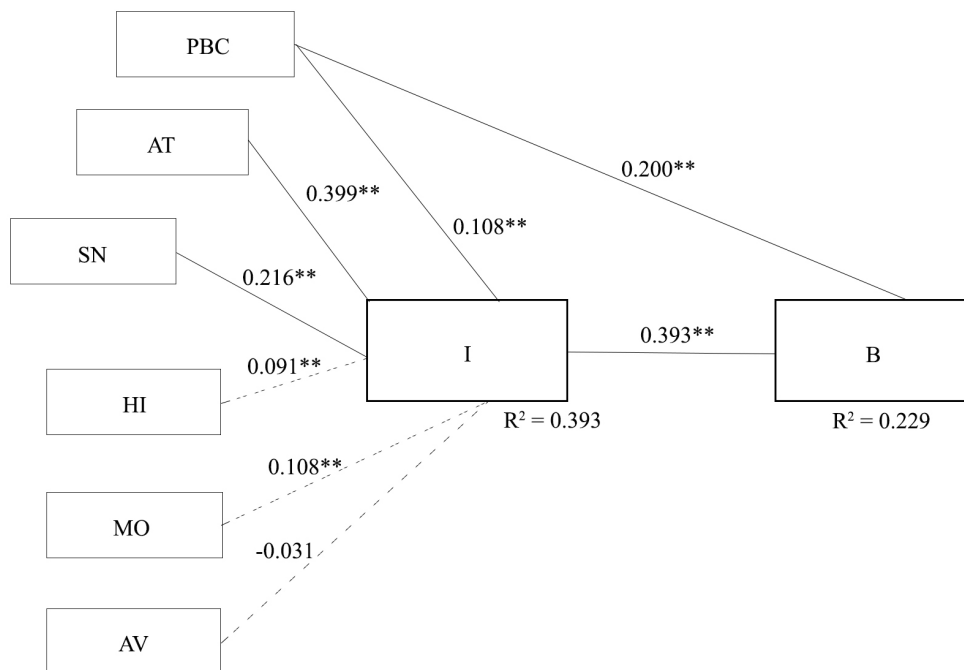


Figure 2. PLS Analysis of the TPB Model

** $p < 0.01$

Discussion

Due to low fresh fish consumption in Croatia, this study focused on determinants of the intention and consumption of fresh fish, aimed at identifying key motives and barriers for fresh fish consumption. The aim of this study was to investigate whether the TPB could predict the intention and consumption of fresh fish in a sample of Croatian consumers. Three constructs were added to the original TPB model that could be relevant for Croatia: availability of fresh fish, health involvement and moral obligation to prepare meals with fresh fish. The results of the present study provide a deeper understanding of consumer intentions and fresh fish consumption in Croatia. As hypothesised, all constructs of the original TPB (attitudes, subjective norm and perceived behavioural control) were significant predictors of the intention to consume fresh fish. As expected, the strongest predictor of intention to consume fresh fish was the construct of attitude. Consumers who perceive fresh fish consumption to be healthy or who enjoy the taste of fresh fish had a stronger intention to consume fresh fish. This confirms previous findings by Verbeke & Vackier (2005) regarding the correlation between attitudes and intention. Taste and the healthy image of fish are two well-appreciated characteristics in fish consumption. Although attitudes towards fresh fish are relatively positive, new information about the importance of regular fresh fish consumption may further contribute to more positive attitudes. Subjective norm had a positive and significant impact on intention, though this affect was only moderate. Therefore, emphasizing the importance of fresh fish on the family table by food experts (and consequently by family and friends) might be beneficial for increasing the subjective norm. Previous studies have confirmed the importance of the subjective norm. According to Thong & Olsen (2008), consumer intention to eat fish is driven significantly by social pressure such as family expectation and “other important” people. Regarding perceived behavioural control, there was a significant and positive relationship between PBC and intention. Consumers who found it difficult to judge the quality of fish had a lower intention to eat fresh fish. Due to these results, increasing the level of knowledge about buying and preparing fresh fish is recommended in Croatian society. Among the added constructs, the strongest predictor of intention was moral obligation. A personal feeling of responsibility to offer the family a meal including fish was confirmed in this study. Based on a study in Norway, Olsen (2001) showed that moral obligation was the second most important predictor of motivation for consuming seafood after negative feelings, and was more important than attitude or preferences. The moral responsibility to prepare fish for the family was also very high in Verbeke & Veckier

(2005), and contributed to a stronger intention to eat fish. People with a high moral obligation and who are inclined to healthy eating are loyal seafood consumers (Olsen, 2004). No association was found between availability and the intention to eat fish, which differed from a previous study (Scholderer & Grunert, 2001) that found a significant impact of the availability of fresh fish on consumption frequency. However, a possible reason for this discrepancy could be the population in the present study. Individuals in the study were predominantly younger, urban residents, where fresh fish is relatively available. Additionally, convenience measured as “fish is readily available in shop” did not prove to be a significant factor (or item) in predicting fish purchasing among a random sample of some 300 consumers in the United Kingdom (Leek *et al.*, 2000). In the present study, health involvement had a low but significant effect on the intention to eat fish. This may be related to the fact that majority of respondents (46%) were relatively young (18–29 years old) and not yet affected with health concerns. This result is similar to the findings of Roininen *et al.* (1999), who indicated that younger subjects were weakly influenced by the health-related attributes of food or by environmental changes that could increase convenience and access to healthier choices (Wiegersma *et al.* 2000). On the other hand, the reason that a construct such as health involvement has a low significant effect is likely the virtually universal acceptance of the idea that fresh fish is healthy. The health belief therefore does not explain why some people eat more fresh fish than others. It is important to note, however, that this does not imply that health is irrelevant as a product attribute (Bredahl & Grunert, 1997). While many studies stop at determining the intention to perform specific behaviour, it is well-known that the intention to perform a certain behaviour does not always lead to that behaviour. This was also demonstrated in the present study by the moderately high positive correlation between intention and fresh fish consumption, and by the lack of a correlation between availability and intention, though availability was associated with fresh fish consumption. Therefore, this study was aimed at determining the role of intention and perceived behavioural control in frequency of fresh fish consumption, as suggested by the model. The consumer intention to eat fresh fish was found to be a significant predictor of fresh fish consumption, which is consistent with other studies using TPB (Wong & Mullan, 2009; Kassem *et al.*, 2003). As such, the frequency of fresh fish consumption increases with increasing intention of fresh fish consumption. Perceived behavioural control was also found to be a significant predictor of fresh fish consumption. The results of the model evaluations implied that the proposed model well predicted intention and fresh fish consumption.

Strengths and limitations

The current study showed that TPB was a useful model in predicting the intention to consume fresh fish in a large sample of fresh fish consumers in Croatia. A major strength of this study was the testing of an extended model of TPB in Croatia, as a Mediterranean country where fish is widely available but consumption is relatively low. Moral obligation was found to be a crucial additional variable when it comes to fresh fish consumption. The findings of this study offer an array of useful information for creating public campaigns aimed at increasing fresh fish consumption. The information gained in this study can be applied by fish producers and sellers, especially when creating marketing strategies and operational marketing activities.

However, there are some limitations of the current study. Firstly, it was based on a contact technique (90% of respondents were surveyed through an on-line survey) as certain populations are less likely to have internet access and to respond to online questionnaires. Furthermore, the use of a non-probability sample in this study does not enable extrapolation of the results to the overall population. According to previous studies, fish consumption varies according to various sociodemographic characteristics. Fish consumption frequency is higher among women, higher income consumers and those living in coastal regions (Verbeke & Vackier, 2005). Future studies should investigate whether there are differences in the TPB constructs among respondents with varying incomes, place of residence and gender, and a comparison should be made of respondents from the continental and coastal regions of Croatia. Moreover, only fresh fish consumers were included in the survey. It would be interesting to determine the main reasons to not eat fresh fish. Finally, the present study measured fresh fish consumption only using a self-report measure that may be biased, so future research should be directed towards a more objective measurement of fresh fish consumption.

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Reference

- AHO (2014). American Health Organisation. Fish 101. available on http://www.heart.org/HEARTORG/GettingHealthy/NutritionCenter/Fish-101_UCM_305986_Article.jsp
- Ajzen, I., (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50, 2, 179–211.
- Altintzoglou, T., Vanhonacker, F., Verbeke, W., Luten, J. (2011). Association of health involvement and attitudes towards eating fish on farmed and wild fish consumption in Belgium, Norway and Spain. *Aquaculture International*, 19(3), 475–488.
- Armitage, C.J., Conner, M. (2001). Efficacy of the Theory of Planned Behaviour: A meta-analytic review. *British Journal of Social Psychology*, 40(4), 471–499.
- Arvanitoyannis, I.S., Krystallis, A., Panagiotaki, P., Theodorou, A.J. (2004). A marketing survey on Greek consumers' attitudes towards fish. *Aquaculture International*, 12(3), 259-279.
- Avery, N.C. (2009). The Difference between Fresh and Frozen Seafood. available on <http://www.culinaryarts.com/>, Accessed: 10.06.2014.
- Bagozzi, R.P., Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 16(1), 74-94.
- Birch, D., Lawley, M. (2010). Repositioning Australian farmed barramundi: Online consumer survey findings, Australian Seafood Cooperative Research Centre and the University of the Sunshine Coast, September 2010.
- Bredahl, L., Grunert, K. G. (1997). Determinants of the consumption of fish and shellfish in Denmark: an application of the theory of planned behaviour. In J. B. Luten, T. Børresen, & J. Oehlenschläger (Eds.), *Seafood from producer to consumer, integrated approach to quality* Amsterdam: Elsevier, 21–30
- Brunsø, K., Verbeke, W., Olsen, S.O., Fruensgaard Jeppesen, L. (2009). Motives, barriers and quality evaluation in fish consumption situations: a comparison between heavy and light users in Spain and Belgium. *British Food Journal*, 111(7), 699–716.
- Burger, J., Gochfeld, M. (2009). Perceptions of the risks and benefits of fish consumption. Individual choices to reduce risk and increase health benefits. *Environmental Research*, 109(3), 343–349.
- CBS (2012). Croatian Bureau of Statistics. Available on http://www.dzs.hr/default_e.htm. Accessed 28.05.2014.

- Chin, W. W., Marcolin, B. L., Newsted, P. R. (1996). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and voice mail emotion/adoption study. *In* J. I. DeGross, S. Jarvenpaa, & A. Srinivasan (Eds.) *Proceedings of the Seventeenth International Conference on Information Systems*, pp. 21-41.
- Cole, G.M., Ma, Q.L., Frautschy, S.A. (2010). Dietary fatty acids and the aging brain. *Nutrition Reviews*, 68(2), 102-111.
- De Bourdeaudhuij, I., Van Oost, P. (1998). Family members' influence on ecision making about food: Differences in perception and relationship with healthy eating. *American Journal of Health Promotion*, 13(2), 73–81.
- Falk, R., Miller, N.B. (1992). *A Primer for Soft-modeling*. University of Akron, Ackron,
- FAO (2008). *Fishery and Aquaculture statistics*. FAO yearbook 2008 available on <http://www.fao.org/docrep/013/i1890t/i1890t.pdf> Accessed 16.12.2014.
- FAO (2011). *World apparent consumption by continent*. FAO_STAT: Food balance sheet of fish and fishery products. 8-13.
- FAO (2014). *State of World Fisheries and Aquaculture, Opportunities and challenges*. Food and Agriculture Organization of the UN, Rome, Italy, 2014
- Fishbein, M., Ajzen, I. (1975). *Belief, attitude, intention, and behaviour: An introduction to theory and research*. Reading, MA: Addison Wesley.
- Fornell, C. G., Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- Gorsuch, R. L., Ortberg, J. (1983). Moral obligations and attitudes: Their relation to behavioural intentions. *Journal of Personality and Social Psychology*, 44, 1025-1028.
- Grieger, J. A., Miller, M., Cobiac, L. (2012). Knowledge and barriers relating to fish consumption in older Australians. *Appetite*, 59(2), 56–463.
- Hearty, A.P., McCarthy, S.N., Kearney, J.M., Gibney, M.J. (2007). Relationship between attitudes towards healthy eating and dietary behaviour, lifestyle and demographic factors in a representative sample of Irish adults. *Appetite*, 48(1), 1–11.
- IOM (2007). *Seafood Choices: Balancing Benefits and Risks*. Washington, DC, USA: National Academy Press. 722.
- ISSFAL (2004). *Recommendations for intake of polynsaturated fatty acids in healthy adults*. International Society for the Study of Fatty Acids and Lipids. p 22.

- Kassem, N.O., Lee, J.W., Modeste, N.N., Johnston, P.K. (2003). Understanding soft drink consumption among female adolescents using the Theory of Planned Behavior. *Health Education Research*, 18(3), 278–291.
- Kwong, K., Wong, K. (2013). Partial Least Squares Structural Equation Modeling (PLS-SEM) Techniques Using Smart PLS. *Marketing Bulletin*. 24, Technical Note 1
- Leek, S., Maddock, S., Foxall, G. (2000). Situational determinants of fish consumption. *British Food Journal*, 102(1), 18–39.
- Mitterer-Daltoé, M.L., Carrillo, E., Queiroz, M.I., Fiszman, S., Varela, P. (2013). Structural equation modeling and word association as tools for a better understanding of low fish consumption. *Food Research International*, 52(1), 56–63.
- Mozaffarian, D., Rimm, E.B. (2006). Fish intake, contaminants, and human health – evaluating the risks and the benefits. *J. Am. Med. Assoc.* 296(15), 1885–1899.
- Myrland, R., Trondsen, T., Johnston, R. S., Lund, E. (2000). Determinants of seafood consumption in Norway: lifestyle, revealed preferences, and barriers to consumption. *Food Quality and Preference*, 11(3), 169–188.
- Oken, E., Choi, A.L., Karagas, M.R., Mariën, K., Rheinberger, C.M., Schoeny, R., Sunderland, E., Korrick, S. (2012). Which Fish Should I Eat? Perspectives influencing fish consumption choices. *Environmental Health Perspectives*, 120(6), 790-798.
- Olsen, S. O. (2001). Consumer involvement in seafood as family meals in Norway: An application of the expectancy-value approach. *Appetite*, 36(2), 173–186.
- Olsen, S.O. (2004). Antecedents of Seafood Consumption Behaviour: An Overview. *Journal of Aquatic Food Product Technology*, 13(3), 79-91.
- Pérez-Cueto, F.J., Pieniak, Z., Verbeke, W. (2011) Attitudinal determinants of fish consumption in Spain and Poland. *Nutr Hosp.* 26(6), 1412-1419.
- Perugini, M., Bagozzi, R.P. (2001). The role of desires and anticipated emotions in goal-directed behaviours: broadening and deepening the theory of planned behaviour. *British Journal of Social Psychology* 40(1), 79–98.
- Pieniak, Z., Verbeke, W., Scholderer, J. (2010). Health-related beliefs and consumer knowledge as determinants of fish consumption. *Journal of Human Nutrition and Dietetics*, 23(5), 480- 488.
- Pomazal, R., Jaccard, J. J. (1976). An informational approach to altruistic behaviour. *Journal of Personality and Social Psychology*, 33(3), 317-326.

- Raats, M. M., Shepherd, R., & Sparks, P. (1995). Including moral dimensions of choice within the structure of the theory of planned behaviour. *Journal of Applied Social Psychology*, 25, 484-494.
- Roininen K., Lähteenmäki L., Tuorila H. (1999). Quantification of consumer attitudes to health and hedonic characteristics of foods. *Appetite*, 33(1), 71-88.
- Rozin, P. (1995). Thinking about and choosing food: Biological, psychological, and cultural perspectives. In *Contemporary challenges in food and food service marketing: Health and pleasure on the table*. Dubé, L. and others (Eds.) Montreal: EAMAR. 173-196.
- Scholderer, J., & Grunert, K. G. (2001). Does generic advertising work? A systematic evaluation of the Danish campaign for fresh fish. *Aquaculture Economics and Management*, 5(5/6), 253–271.
- Schwartz, S. H., Tessler, R. (1972). A test of a model for reducing measured attitude-behaviour discrepancies. *Journal of Personality and Social Psychology*, 24(2), 225-236.
- Sioen, I., Matthys, C., De Backer, G., Van Camp, J., De Henauw, S. (2007a). Importance of seafood as nutrient source in the diet of Belgian adolescents. *J. Hum. Nutr. Diet.* 20(6), 580–589.
- Sioen, I., Van Camp, J., Verdonck, F., Verbeke, W., Vanhonacker, F., & Willems, J. (2007b). Probabilistic intake assessment of multiple compounds as a tool to quantify the nutritional-toxicological conflict related to fish consumption. *Chemosphere*, 71(6), 1056–1066.
- Thong, N.T., Olsen, S.O. (2008). Motivation to Consume Fish (Seafood) in Vietnam. International Institute of Fisheries Economics and Trade. 14th IIFET Conference, 22. – 25 July 2008.
- Trondsen, T., Braaten, T., Lund, E. & Eggen, A.E. (2004a). Health and seafood consumption patterns among women aged 45-69 years. A Norwegian seafood consumption study. *Food Qual. Prefer.* 15(2), 117–128.
- Trondsen, T., Braaten, T., Lund, E., Eggen, A.E. (2004b). Consumption of seafood—the influence of overweight and health beliefs. *Food Quality and Preference* 15(4) 361–374.
- Trondsen, T., Scholderer, J., Lund, E., Eggen, A. E. (2003). Perceived barriers to consumption of fish among Norwegian women. *Appetite*, 41(3), 301–314.
- Verbeke, W., Sioen, I., Pieniak, Z., Van Camp, J. & De Henauw, S. (2005). Consumer perception versus scientific evidence about health benefits and safety risks from fish consumption. *Public Health Nutrition*. 8(4), 422–429.

- Verbeke, W., Vackier, I. (2005). Individual determinants of fish consumption: application of the theory of planned behaviour. *Appetite*, 44(1), 67-82.
- Verbeke, W., Vanhonacker, F., Frewer, L.J., Sioen, I., De Henauw, S., Van Camp, J. (2008). Communicating risks and benefits from fish consumption: Impact on Belgian consumers' perception and intention to eat fish. *Risk Analysis*, 28(4), 951-967.
- Verbeke, W., Vermeir, I., Brunsø, K. (2007). Consumer evaluation of fish quality as basis for fish market. *Food Quality and Preference*, 18(4), 651-661.
- Wall, R., Ross, R.P., Fitzgerald, G.F., Stanton, C. (2010). Fatty acids from fish: the anti-inflammatory potential of long-chain omega-3 fatty acids. *Nutrition Review*; 68(5), 280-289.
- Welch, A.A., Lund, E., Amiano, P., Dorronsoro, M., Brustad, M., Kumle, M., Rodriguez, M., Lasheras, C., Janzon, L., Jansson, J., Luben, R., Spencer, E.A. Overvad, K., Tjønneland, A., Clavel-Chapelon, F., Linseisen, J., Klipstein-Grobusch, K., Benetou, V., Zavitsanos, X., Tumino, R., Galasso, R., Bueno-de-Mesquita, H.B., Ocké, M.C., Charrondière, U.R., Slimani, N. (2002). Variability of fish consumption within the 10 European countries participating in the European Investigation into Cancer and Nutrition (EPIC) study. *Public Health Nutrition*, 5(6B), 1273–1285.
- Wiegersma, P.A., Hofman, A., Ziealhuis, G.A. (2000). Prevention of unhealthy behaviour by youth health care in The Netherlands, *Journal of Public Health Medicine*, 22(3), 386-392.
- Wong, C.L., Mullan, B.A. (2009) Predicting breakfast consumption: An application of the theory of planned behaviour and the investigation of past behaviour and executive function. *British Journal of Health Psychology*, 14(3), 489-504.