Consumer Food Health Competencies, Involvement and Body Mass Index[*]

By

Torben Hansen, Professor, Ph.D.
Department of Marketing, Copenhagen Business School
Solbjerg Plads 3, 2000 Frederiksberg, Denmark
Tel +4538152100 – Fax +4538152101 – E-mail th.marktg@cbs.dk

and

Thyra Uth Thomsen, Associate Professor, Ph.D.
Department of Marketing, Copenhagen Business School
Solbjerg Plads 3, 2000 Frederiksberg, Denmark
Tel +4538152100 – Fax +4538152101 – E-mail tt.marktg@cbs.dk

[*] This research was supported by a research grant from the Danish Council for Strategic Research, Programme Commission on Food and Health.

Consumer Food Health Competencies, Involvement and Body Mass Index

Summary

The obesity crisis present in most Western countries imposes a serious threat to economic welfare and has severe consequences for the health and quality of life of the individual consumer. Along herewith, an increasing complexity in the food marketplace suggests that many consumers may find it difficult to shop and to prepare healthy food. While several possible food health strategies are available to food authorities the ongoing obesity problem still remains to be solved. This paper investigates the possible effect of one food health strategy: educating food consumers in order to increase their food health competencies. This paper develops a conceptual model for understanding the role of food health competencies in explaining consumer Body Mass Index, BMI. In the framework, BMI is driven by consumer food health competency. Food health involvement is seen as an antecedent of food health competency, whereas personal food identity and unhealthy food taste beliefs both are seen as antecedents of food health involvement. The framework also proposes that the relation between food health competency and BMI may be moderated by the extent to which consumers find it demanding to engage in healthy food behaviour. In this study, one qualitative (n=16) and one quantitative (n=53) pilot study assisted in developing the framework and in validating construct measurements. Data consist of 599 food consumers using a nationally representative consumer-panel. The obtained Lisrel results suggest that educating consumers may facilitate healthier food choices associated with a lower BMI. However, the results also indicate that increased food health competencies may have a reduced effect on BMI for consumers who perceive healthy food behaviour to be demanding. Moreover, the results revealed that less motivated consumers tend to be less likely to develop improved food health competencies. The results suggest two factors, personal food identity' and 'unhealthy food belief', that authorities can address in order to increase consumers' food health involvement.

Introduction

Overweight and obesity has become a serious problem in - especially - the Western world and both authorities and consumers have become increasingly concerned about health issues related to their food intake (Smed and Jensen, 2005; Nordic Plan of Action, 2006¸WHO 2006). While this trend imposes a serious threat to economic welfare it also has severe consequences for the health and quality of life of the individual consumer. In Sweden, the total yearly costs of overweight and obesity has been calculated to around EUR 1.7 billion, corresponding to 0.7% of GDP (Nordic Plan of Action, 2006). Similar estimates have been reported for the US and UK (Suhrcke et al., 2006). Facing such circumstances, it is not surprising that both authorities and consumers in most industrialized countries have become increasingly concerned about health issues related to their food intake (Smed and Jensen, 2005). Nevertheless, many consumers do not follow the official recommendations on diet and physical activity. For instance, in Scandinavia too many consumers have a much too low intake of fruits & vegetables and fish and a too high intake of (especially) saturated fat. In 2006 the average intake of sugar corresponds to the recommended maximum and for children the sugar intake exceeds the recommended maximum (Nordic Plan of Action, 2006). Nevertheless, evidence suggests that consumers, on average, may pay some attention to health related information and that such information might subsequently affect consumer behaviour. For example, information concerning the negative impacts of cholesterol (Schmidt and Kaiser, 1998) and salmonella (Smed and Jensen, 2005) has been found to reduce the consumption of shell eggs. However, the environment in which the food consumer must plan and execute her/his behaviour has become increasingly complex. Every day consumers are exposed to information from nutritionists about what to eat in what amount and some of this information may be perceived as both complex and conflicting (Donaldson, 2006). For instance, is red wine good or bad and what about coffee? Ethical issues concerning production methods, pollution and distribution adds to the complexity of the environment in which the consumer has to conduct her/his food health behaviour.

Several food health strategies have been considered by authorities to support a healthy food intake, including (a) reducing taxes for healthy food items/categories and/or increasing taxes for unhealthy food items/categories; (b) introducing various form of simplified health labels; (c) imposing legal restrictions on the marketing of unhealthy food

items; and (d) educating consumers in order to make them more qualified to detect healthier food choices. To date, none of these strategies have, however, successfully solved the overweight and obesity problem. One reason may be that the resources invested in implementing one or more of these strategies might have been insufficient. Another reason might be that turning around the obesity crisis is a long-term task and that food health strategies can therefore only be evaluated after a longer period of time. On the other hand, authorities should of course not be 'blindfolded' when carrying out food health strategies – hoping that over time positive results will eventually reach the surface. Reflecting this premise, the purpose of the present research is to investigate the possible effects on consumer health [which we operationalise by Body Mass Index, BMI][1] of the food health strategy referred to as strategy (d) above. Educating consumers in order to increase their food health competencies is a long-term strategy, which may take up considerable sums of money and time resources. Therefore, it is important that the likely BMI effect of such a strategy is investigated beforehand. Moreover, possible antecedents of consumer food health competencies should also be investigated in order to provide guidance to food authorities on how food health competencies might be increased. The paper is organized as follows. First, a conceptual model for understanding antecedents to consumer competencies and the relation between competencies and BMI is developed. Next, the research methodology is developed. Then, the obtained results are presented. Finally, we discuss the implications of the study and provide suggestions for further research.

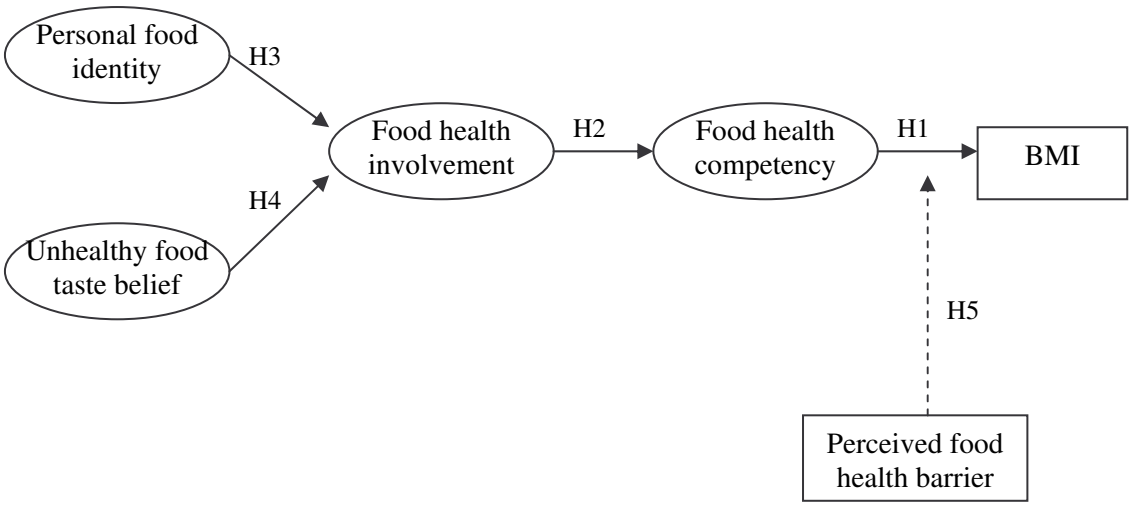
Conceptual model and research hypotheses

This section develops a conceptual model for understanding the role of food health competencies in explaining consumer BMI (Figure 1). In the framework, BMI is driven by consumer food health competency. Food health involvement is seen as an antecedent of food health competency, whereas personal food identity and unhealthy food taste beliefs both are seen as antecedents for food health involvement. The framework also proposes that the relation between food health competency and BMI may be moderated by the extent to which consumers find it demanding to carry out healthy food behaviour.

[1] BMI is a standardized measure of body mass and is calculated as [BMI=weight (kg) / height² (m²)].

Figure 1

Conceptual Model



The framework was developed partly on the basis of a literature review of previous research dealing with consumer food health behaviour, partly on the basis of in-depth interviews with 16 Danish consumers with an equal participation of women and men. Eight interviewees were randomly selected among undergraduate business students at a large Scandinavian Business School and the remaining eight interviewees were selected among 'ordinary' consumers with a focus on getting a variation among the participants in relation to sex, education and occupation. The interviews were semi-structured around a few guiding themes, including food involvement, food healthiness and food health behaviour. The interviews were audio-recorded and lasted on average 1-1½ hour.

Food health competency

Prior knowledge can be regarded as the amount and organization of cognitive representations about a topic (like food healthiness). These representations are encoded and organized in memory as a topic-related cognitive structure or schema (Okechuku, 1992). The more highly developed the cognitive structure, the more knowledgeable and competent the individual is about the topic in question (Zinkhan and Muderrisoglu, 1985). An increasing complexity in the food marketplace suggests that many consumers may be unable to buy their food with confidence and also that they may find it difficult to justify

their decisions by making evaluations and comparisons of the individual food health attributes. In such an environment healthy food choices are made harder for the consumer. Evidence (Zinkhan and Braunsberger, 2004) suggests that a well-developed competence structure is likely to reduce perceived complexity and to increase perceived competency towards particular decision problems. Moreover, as stated by Jayanti and Burns (1998), "it is generally believed that knowledge facilitates information search, and highly knowledgeable consumers acquire and retain more information compared with people with less knowledge" (p. 9). Thus, we expect that health competent consumers are more likely to have a healthy food intake – associated with a lower BMI – than less health competent consumers. We hypothesize as follows.

H1: Food health competency is negatively related to BMI.

Food health involvement

A person's feeling of personal relevance is the motivation to search for, acquire and process stimulus-relevant information (Beatty, Kahle, and Homer 1988). Celsi and Olson (1988) refer to this motivational state as felt involvement. In general, most consumer researchers view perceived personal importance and relevance as the essential characteristics of involvement (e.g., Beatty, Kahle, and Homer 1988; Celsi and Olson, 1988). Food health involvement we therefore conceptualize as the degree of personal importance and relevance a consumer in attach to healthy food intakes. In a situation of high perceived involvement the consumer is likely to expend a high degree of cognitive effort in message comprehension, elaboration and evaluation (Okechuku, 1992; Moorman and Matulich, 1993). Moreover, highly involved consumers are more likely to engage in active learning and are likely to develop stronger competencies toward the subject in question (Beatty, Kahle, and Homer 1988). Thus, we hypothesize.

H2: Food health involvement is positively related to food health competency.

Personal Food Identity

The conducted in-depth interviews suggested that several respondents regarded their food intake to be closely related to their identity. One of the common expressions, which also

have been used in public health campaigns and currently is used as a program title by the Scandinavian TV channel 'TV3', were "you are what you eat". This view is consistent with previous research suggesting that self-identity reflects the "labels people use to describe themselves" (Biddle, Bank and Slavings, 1987, p. 326) and can be seen as the pertinent part of an individual's self that relates to a particular behaviour (Conner and Armitage, 1998). We propose that food behaviour may be closely linked to consumers' self-identity and conceptualize personal food identity as the extent to which one believes that one's health-identity is associated with one's food behaviour. In marketing it is generally believed that the degree to which consumers perceive a product or service to be self relevant can affect consumers' level of motivation (i.e., involvement) to learn about, shop for, and ultimately buy the product or service (Olson and Walker, 1991; Beatty, Kahle, and Homer 1988; Belk 1988). In line with this suggestion we hypothesize as follows.

H3: Personal food identity is positively related to food health involvement.

Unhealthy food taste belief

Consider the following speculation offered by Raghunathan, Naylor and Hoyer (2006): "What if people consume food that is considered unhealthy not despite its perceived unhealthiness but rather *because* of it? That is, what if part of the attractiveness of food lies in its perceived unhealthiness? This can happen if consumers intuitively believe that the unhealthier the food, the tastier it is" (page 170). Several of our 16 respondents confirmed this speculation, e.g., one respondent saying that "what tastes good usually is not good for your health" and, moreover, the unhealthy=good taste speculation was confirmed by Raghunathan et al. in their study. Since food that taste bad are less likely to produce enjoyment and pleasure in peoples' lives (German, 2008) and since pleasure-feeling is closely related to level of involvement (Kapferer and Laurent, 1985; Rodgers and Schneider, 1993) we expect that healthy food may be deemed less relevant by consumers who tend to associate healthy food with a less favourable taste. This can happen because the individual may have preferences for the present and enjoyable (i.e., good taste) at the expense of the future (i.e., healthiness) (Kivetz and Simonson, 2002). We conceptualize unhealthy food taste belief as the extent to which one believes that unhealthy food is more enjoyable and tastier than healthy food and hypothesize as follows.

H4: Unhealthy food taste belief is negatively related to food health involvement.

Perceived food health barrier

Previous research (e.g., de Castro, 1997; Lloyd, Paisley, and Mela, 1995) has identified a number of factors that may prevent consumers from maintaining healthy eating practices, including social factors, the cost of food, busy lifestyle, the availability of healthy food items, among others. A large study (n=14331) dedicated to investigating the main perceived barriers that people have in trying to eat a healthy diet revealed that time was among the most frequently mentioned perceived barriers to healthy eating (Kearney and McElhone, 1999). This result is supported in our in-depth interviews in which several respondents mentioned that it often is too time demanding and too inconvenient to provide healthy food. Results obtained by Drewnowski and Darmon (2005) also suggest that a high convenience associated with unhealthy food is among the principal reasons for overeating and weight-gain. In this study we conceptualize perceived food health barrier as how demanding it is to engage in healthy food behaviour. In line herewith, we expect consumers with a high perceived food health barrier to be less likely to develop a positive health related behaviour and hence to have a higher BMI (compared to consumers with a low perceived food health barrier). Thus, we hypothesize as follows.

H5: The effect of food health competency will be moderated by perceived food health barrier, such that food health competency will be more negatively related to BMI when perceived food health barrier is low (compared to high).

Methodology

Measurements

Multiple item 7-point Likert scales (1=disagree totally; 7=agree totally) were applied for each of the five theoretical constructs used in this study. In addition to the input obtained from the pretest (see below) we also draw on previous research. In measuring 'food health involvement' and 'food health competency' we draw on numerous authors, including Beatty and Talpade (1994), Berg (2007), Grønhøj (2007), and Westbrook (1980). To measure 'personal food identity', 'healthy food taste beliefs', and 'food health barriers' we

draw on dimensions identified by Belk (1988), Raghunathan, Naylor and Hoyer (2006), Drewnowski and Darmon (2005), and Kearney and McElhone (1999).

Pretest – initial verification of measurement scales

The constructs that emerged from our depth interviews and our literature review were pretested in order to provide an initial verification of the measurement scales. 110 undergraduate and graduate students, all associated with a large Scandinavian Business School, and members of the researchers' networks were contacted for the purpose of pretesting the applied constructs. This resulted in a usable sample of 53 on which base the concepts were refined. On each of the multi-item scales a three-step item purification procedure was conducted. *First*, an exploratory factor analysis was conducted for each of the constructs using an eigenvalue of 1.0 as the cut-off point. *Second*, inter-item and item-to-total correlations were computed for each item. All items should have a significant correlation coefficient at the 0.01 level. *Third*, Cronbach's alpha was computed for each of the constructs. In case of a low alpha value (<0.70) the lowest item-to-total correlation was removed until the alpha value was $\geq$0.70 for each of the constructs. This procedure deleted several items from the measurement scales. With these items deleted, all constructs showed Cronbach alphas >0.70 and all inter-item and item-to-total correlations were significant at the 0.01 level. Thus, no further corrections were made on the applied measurement scales. The applied measurements are shown in the appendix.

Data collection

Data was collected in a nationally representative consumer-panel among 718 Danish consumers using a web-based questionnaire. In total, 1400 consumers were contacted resulting in a response rate of 51%. The data collection was carried out by the market research agency Gallup. All respondents were screened to make sure that they regularly carry out food shopping. After eliminating questionnaires with missing responses on any of the items included in the applied concepts, we ended up with valid responses from 599 consumers. Checks against item non-response bias (Bosnjak and Tuten, 2001) were performed by conducting χ^2-tests on a number of demographic characteristics (including gender, age, educational level, household income, and household grocery budget) to determine whether the sample corrected for missing scale responses (survey sample) differs

systematically from the original (uncorrected) sample. The conducted χ^2-tests produced all p-values >0.50, indicating that no noticeable item non-response bias is apparent. Of the respondents, 53.9% were women, the average household size was 2.3, and the average age was 51.5 years and ranged between 18-88 years with a fairly normal spread.

Results

Specification of the investigated model

The conceptual model in Figure 1 was translated into a Lisrel model consisting of a measurement part (confirmatory factor analysis, CFA) and a structural equation part (simultaneous linear regression). The relationships between the variables were estimated by maximum likelihood estimation. The framework was tested using a two-stage analysis. First, conducting confirmatory factor analysis on the applied multi-item scales developed the measurement models. Next, the measurement models and the structural equation paths were estimated simultaneously to test the proposed model (overall model). We applied this two-stage method to ensure that the measures of the constructs are reliable and valid before conclusions about relations between constructs are carried out.

Validation of the measurement model

CFA was used to investigate construct reliability and verify measurement reliability for personal food identity, unhealthy food taste belief, food health involvement, and food health competency. Tables 1 and 2 summarize the construct intercorrelations and CFA results.

Table 1

Construct Intercorrelations

	Personal food identity	Unhealthy food taste belief	Food health involvement	Food health competency
Personal food identity	1.00			
Unhealthy food taste belief	-.28	1.00		
Food health involvement	.66	-.65	1.00	
Food health competency	.56	-.54	.86	1.00

The measurement model yields a chi-square of 265.19 (d.f.=49, p<.01). However, since the chi-square test is highly sensitive to sample size (MacCallum and Austin, 2000) other fit measures are given greater prominence in evaluating model fit (e.g., Ye, Marinoa and Singh, 2007). The root mean square error of approximation (RMSEA=.08), the comparative fit index (CFI=.93) and the normed fit index (NFI=.92) show an acceptable degree of fit of the measurement model (Bagozzi and Yi, 1988; Browne and Cudeck, 1993). The expected relationships between constructs and their indicators are supported with all items significantly related to their constructs.

Table 2

Confirmatory Factor Analysis Results

Construct/indicator	Standardized factor loading[a]	Critical ratio	Construct reliability	Convergent validity
Personal food identity			.76	.51
X1 You are what you eat	.73	-		
X2 What I eat is making me who I am	.74	14.37		
X3 My diet is a central part of my identity	.67	13.56		
Unhealthy food taste belief			.77	.53
X4 Often unhealthy food tastes better than healthy food	.68	-		
X5 Healthy food is less enjoyable than unhealthy food	.69	13.74		
X6 Healthy food often has a dull taste	.81	14.69		
Food health involvement			.84	.58
X7 I'm usually bored when I listen to discussions about health*	.53	-		
X8 Eating healthy is not important to me*	.78	16.65		
X9 In general, I'm very interested in healthy food products	.82	17.40		
X10 Living a healthy life is very important to me	.88	18.45		
Food health competency			.68	.54
X11 Where healthy food shopping is concerned, I consider myself highly competent	.91	-		
X12 I find it difficult to put together a healthy meal*	.50	10.92		

[a] One item for each construct was set to 1.

* Item inverted.

BMI is an observed variable and is therefore not included in the CFA.

The composite reliabilities were all equal to or exceeded .70, except for one construct (food health competency, $_{\text{composite reliability}=.68}$), which however was close to .70. This indicates an acceptable reliability of each the measured constructs. Convergent validity of individual constructs in the model is confirmed because the mean of the squared factor loadings is greater than .5 for all latent constructs (Bagozzi and Yi, 1988) (Table 2).

Comparing the baseline measurement model to alternative models in which the covariances between pairs of constructs were constrained to unity initially tested discriminant validity (Anderson and Gerbing, 1988). In four of the investigated six cases, the constrained model produced a significant increase in chi-square value (p-value<.05), demonstrating the existence of sufficient discriminating validity for these cases. Insignificant increases in chi-square values were detected for personal food identity with respect to its pair wise covariance with healthy food competency and for healthy food involvement with respect to its pair wise covariance with healthy food competencies. However, as a path from general food health involvement to food health competency was hypothesized, this latter result is not surprising and should not in itself be regarded as a violation of discriminant validity. In order to further investigate discriminant validity for the personal food identity-food health competency relation, the method proposed by Fornell and Larcker (1981) was applied. Fornell and Larcker's procedure is considered a demanding test for discriminant validity (e.g., Grevwal, Cote and Baumgartner, 2004). The extracted variance for each of the two constructs was .51 and .54, respectively, which in both cases are greater than the squared correlation (=.31) between constructs suggesting that sufficient discriminant validity is obtained.

As recommended and adapted by several authors (e.g., Ramani and Kumar, 2008) we used Harmon's one-factor test to investigate whether common method variance may imposes a threat to the interpretation of our findings. The single latent factor accounting for all the manifest variables yielded a chi-square value of 717.22 (d.f.=54, p<.01). A chi-square difference test between the chi-square values of the two models suggested that the fit of the one-factor model was significantly worse than the fit of the four-factor model ($\Delta\chi^2$=452.03, Δd.f.=5, p<.01) indicating that the measurement model was robust to common method variance. Also, evidence of common method bias usually results in extremely high correlations (r>.90) (Bagozzi, Yi and Phillips, 1991). The correlation matrix (Table 1) did not suggest such high correlations.

Validation of the structural model

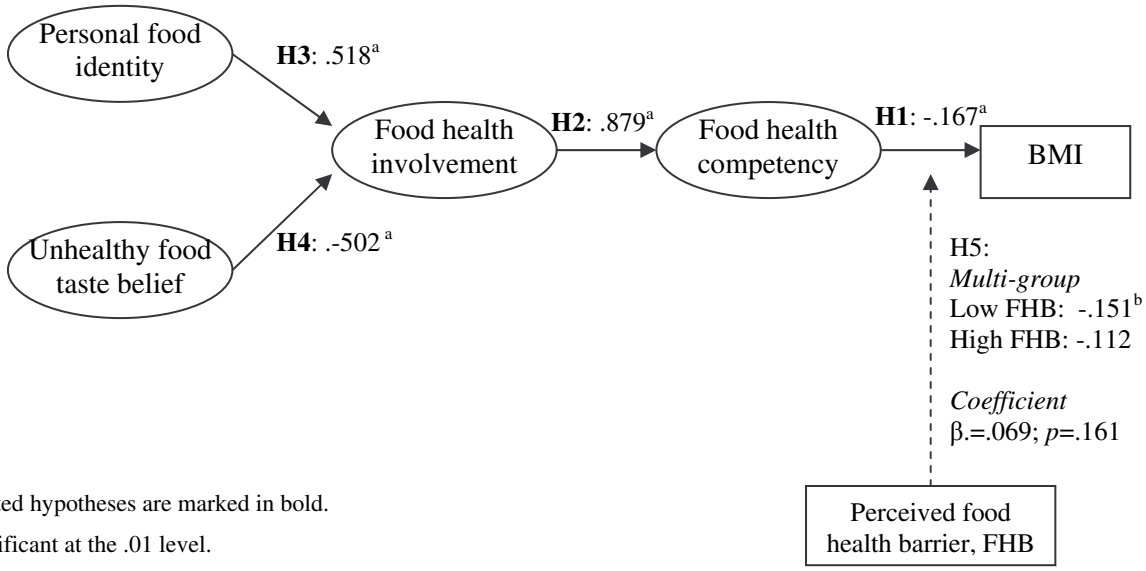
The applied fit measures indicate that the specified path model provides a sufficient fit to the data (χ^2=284.74, df.=61; CFI=.93; NFI=.92; RMSEA=.08). To further validate the structural model at the overall level, the model was compared against a baseline model in which all the four constructs found in Figure 1 were allowed to affect BMI - and in which no mediating effects were specified. In the baseline model the chi-square increased to 1169.16 (df.=61), the values of CFI and NFI decreased to .67 and .66, respectively, while the value of RMSEA increased to .17. These results clearly suggest that the specified path model is superior to the baseline model.

Testing hypotheses 1-4

Standardized beta-coefficients from the estimated structural model are reported in Figure 2. It was proposed that food health competency would be negatively related to BMI (H1). This proposition was confirmed (standardized coefficient of -.167, p-value<.01). H2 was also confirmed in the study, as food health involvement positively affected food health competency (standardized coefficient of .879, p-value<.01). From H3 we expected that personal food identity would positively affect food health involvement. This expectation was supported as we obtained a positive relation between constructs (standardized coefficient of .518, p-value<.01). H4 is supported, as unhealthy food taste belief negatively affected food health involvement (standardized coefficient of -.502, p-value<0.01).

Figure 2

Structural Equation Model and Multigroup Analysis Results: Standardized Coefficients



Accepted hypotheses are marked in bold.

[a]: Significant at the .01 level.

[b]: Significant at the .05 level.

Testing hypothesis 5

We conducted multi-group analysis to test the moderation hypothesis H5. First, the perceived food health barrier construct was analyzed in order to assess reliability and construct validity. The four items used as indicators of the perceived food health barrier construct had all significant paths (ranging from .60 to .77) from the construct and residuals were low. Composite reliability showed a value of .78 and the mean of the squared factor loadings was .47. A summated scale comprising the four items measuring the food health barrier construct was calculated and the scale was then median split in two subgroups. Median split was deemed appropriate since an examination of the frequency distribution for the food health barrier construct showed a peak on both sides of the median indicating that bimodality was obtained (Hair et al., 2006). To test if the measurement models were the same across groups, two separate two-group model-analyses were conducted. One model was unconstrained and one model was estimated with the constraint that the loadings for the indicator variables on their respective latent variables are the same across subsamples. The fit measures were similar for both the constrained and the unconstrained analyses. The

values of CFI were in both models above .90 and the values of RMSEA were .06 for both models. Thus, the food health competency-BMI path could then be separately examined across subsamples. The standardized coefficient for food health competency – BMI was negative and significant (-.151, p=.016) for the subgroup with low food health barrier level, but was not significant (standardized coefficient of -.112, p=.069) for the subgroup with a high food health barrier level preliminary indicating that H5 is supported by the data (Figure 2). However, a chi-square difference test between the two estimated path coefficients did not confirm that the coefficients were significantly different (p=.752).

Since the result of multi-group analysis is not straight forward we further investigated the potential influence of the food health barrier construct on the relation between food health competency and BMI employing the procedure recommended by Chin, Marcolin and Newsted (2003). Following this procedure the moderating effect of health barrier was tested as part of a structural model comprising the two latent concepts competency and food health barrier as well as an interaction construct. The interaction construct was formed by cross-multiplying all standardized items of each factor (i.e., competencies × food health barrier). Both the two main effects and the interaction effect on BMI were estimated in the model. Because the error terms for the product indicators are partially correlated with the error terms for the indicators of the other exogenous constructs partial least squares (PLS) estimation was utilised. In contrast to maximum likelihood estimation such correlations may actually help provide a more accurate estimation of the interaction effect when using PLS. The reason is that there is a known bias in PLS that underestimates the structural effects (cf. Chin et al., 2003, page 198). The standardized effect of the interaction term on BMI was .069 (p=.161) supporting the direction of hypothesis 5 – but insufficient to confirming the hypothesis. H5 is therefore rejected. The direct effect of food health barrier on BMI was not significant (standardized coefficient of .002, p=.983), whereas the direct effect of competency on BMI (standardized coefficient of -.175, p-value=.033) still proved to be significant when the effect of the interaction term on BMI was accounted for.

Discussion and conclusion

Our results suggest that educating consumers may facilitate healthier food choices associated with a lower BMI. Since educating consumers is a strategy that may put high

burdens on government resources it is vital that the likely effect on obesity and overweight of such a strategy is investigated beforehand. Our results also revealed that less involved consumers tend to be less likely to develop improved food health competencies. We identified two ways of attending to this: First of all, since 'personal food identity' is positively linked to involvement, authorities should stress the importance of healthy food for self-identity. Second, since the belief that unhealthy food is tastier is negatively linked to food health involvement, food authorities may wish to stress that healthy food does not conflict with tasteful food when carrying out food health campaigns and the like. Based on a combination of previous research and in-depth interviews with food consumers, this study focused on how demanding it is to engage in healthy food behaviour as a food health barrier. The results reveal, however, that the link between food health competencies and BMI may be – at best – only slightly moderated by consumers' perceived food health barrier.

It should be emphasized that this study only provides a snapshot of the possible relations between involvement, competencies, BMI, etc. Therefore, the actual (future) BMI patterns resulting from increased food health competencies might lead to modified results. Such inconsistencies may occur because of developments and changes in e.g., the development of new healthy food product variants, consumer characteristics, perceived food market complexity, consumer time conditions, situational factors, etc. Another limitation is that we used only one moderating construct (i.e., food health barriers) in the assessment of factors that may moderate the relation between food health competencies and BMI. Other constructs and variables, such as e.g., the food health norm present in the consumer's social surroundings, may also play an important role in the consumer's food health behaviour, thus limiting the main effect of competencies and the moderating influence of food health barrier on BMI. Future research may wish to consider such additional moderators.

References

Anderson, J. C. and Gerbing, D. W. (1988), Structural equation modeling in practice: A review and recommended two-step approach, *Psychological Bulletin*, 103(3), 411-423.

Bagozzi, R.P. and Y. Yi. (1988), On the Evaluation of Structural Equation Models, *Journal of the Academy of Marketing Science*, 16, 74-94

Bagozzi, R.P., Yi, Y., Phillips, L.W., (1991); "Assessing construct validity in organizational research", *Administrative Science*, Q. 36, 421–58.

Beatty, S.E., Kahle, .L.R. and Homer, P. (1988), "The Involvement-Commitment Model: Theory and Implications", *Journal of Business Research*, 16(2), 149-167

Beatty, S.E. and Talpade, S. (1994). Adolescent influence in family decision making: A replication with extension. *Journal of Consumer Research,* 21(2), pp. 332-341.

Belk, Russell W. (1988), Possessions and the Extended Self, *Journal of Consumer Research*, 15 (September), 139-168.

Berg, L. (2007), Competent consumers? Consumer competence profiles in Norway, *International Journal of Consumer Studies*, 31, 418-427.

Biddle, B. J., Bank, B. J., and Slavings, R. L. (1987), Norms, preferences, identities and retention decisions, *Social Psychology Quarterly,* 50*,* 322–337.

Bosnjak, M. and Tuten. T.L. (2001), Classifying response behaviors in Web-based Surveys. *Journal of Computer-Mediated Communication* 6(3), Available: http://www.ascusc.org/jcmc/vol6/issue3/boznjak.html

Browne, M.W. and Cudeck, R. (1993), Alternative ways of assessing model fit. In: Bollen, K.A. and Long, J.S. (Eds.) *Testing Structural Equation Models*, 136–162. Beverly Hills, CA: Sage.

Celsi, R.L. and Olson, J.C. (1988). The role of involvement in attention and comprehension processes, *Journal of Consumer Research,* 15, 210-224.

Chin,W.W., Marcolin, B. L., and Newsted, P. R. (2003), A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study, *Information Systems Research*, 14(2), 189–217.

Conner, M. and Armitage, C.J. (1998), Extending the theory of planned behaviour: review and avenues for further research, *Journal of Applied Social Psychology*, 28, 1429–1464.

de Castro JM (1997) Socio-cultural determinants of meal size and frequency. *British Journal of Nutrition* 77 (Supplement 1), 39–55.

Dhar, R. and Wertenbroch, K. (2000). Consumer Choices between Hedonic and Utilitarian Goods. *Journal of Marketing Research*, February, 60-71.

Donaldson, R.H. (2006). The Great Food Debate. *Food Marketing* July: 12-23.

Drewnowski, A.; Darmon, N. (2005), Food Choices and Diet Costs: an Economic Analysis, *Journal of Nutrition*, April, 135(4), 900-904,

Fornell, C. and Larcker, D.F. (1981), Evaluating structural equation models with unobservable variables and measurement error, *Journal of Marketing Research*, 18, pp. 77-90.

German, J.B. (2008), Looking into the future of foods and health, *Innovation: Management, Policy & Practice*, 10(1), 109-120.

Grewal, R., Cote, J.A., and Baumgartner, H. (2004), Multicollinearity and Measurement Error in Structural Equation Models: Implications for Theory Testing," *Marketing Science*, 23 (4), 519–529.

Grønhøj, A. (2007), The consumer competence of young adults: a study of newly formed households, *Qualitative Market Research: An International Journal*, 10(3), pp. 243-264.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., and Tatham, R.L. (2006), *Multivariate Data Analysis*, sixth edition, Pearson Prentice Hall, New Jersey.

Jayanti, R.K. and Burns, A.C., (1998), The Antecedents of Preventive Health Care Behaviour: An Empirical Study, *Journal of the Academy of Marketing Science*, 26(1) 6-15.

Kapferer J-N. and Laurent G. (I985), Consumers' involvement profiles: a new practical approach to consumer involvement, *Journal of Advertising Research* 25(6) (December-January), 48-56.

Kearney, J.M. and McElhone, S.(1999), Perceived barriers in trying to eat healthier? results of a pan-EU consumer attitudinal survey, *British Journal of Nutrition*, June, 81(Supplement 1), 133-137.

Kivetz, R. and Simonson, I. (2002). Self-Control for the Righteous: Toward a Theory of Precommitment to Indulgence. *Journal of Consumer Research,* 29 (September)*,* 199-217.

Lloyd HM, Paisley CM & Mela DJ (1995) Barriers to the adoption of reduced-fat diets in a UK population. *Journal of American Clinical Nutrition* 95, 316–322.

MacCallum, R.C., Austin, J.T. (2000), Application of Structural Equations Modeling in Psychological Research, *Annual Review of Psychology*, 51, 201-226.

Moorman, C. and Matulich, E. (1993), A Model of Consumers' Preventive Health Behaviors: The Role of Health Motivation and Health Ability. *Journal of Consumer Research*, 20(2), 208-228.

Nordic Plan of Action (2006). Health, food and physical activity – Nordic Plan of Action on better health and quality of life through diet and physical activity. *Nordic Council of Ministers*, ANP 2006.

Okechuku, C. (1992), The relationships of prior knowledge and involvement to advertising recall and evaluation, *International Journal of Research in Marketing*, 9, 115-130.

Olson, J.C. and Walker, B.A. (1991), Means-End Chains: Connecting Products With Self, *Journal of Business Research*, 22, 111-118.

Raghunathan, R., Naylor, R.W., Hoyer, W.D. (2006), The Unhealthy = Tasty Intuition and Its Effects on Taste Inferences, Enjoyment, and Choice of Food Products, *Journal of Marketing*, October, 70(4), 170-184.

Ramani, G. and Kumar V. (2008), Interaction Orientation and Firm Performance, *Journal of Marketing*, 72(January), 27-45.

Rodgers W.C. and Schneider K.C.1993, An empirical evaluation of the Kapferer-Laurent consumer involvement profile scale, *Psychology and Marketing* 4 (July-August): 333-345.

Schmidt, T.M. and Kaiser, H.M. (1998). Egg advertising, dietary cholesterol concerns, and US consumer demand. *Agricultural and Resource Economics Review* 27(1): 23-34.

Smed, S. and Jensen, J.D. (2005), Food safety information and food demand, *British Food Journal* 107(3), 173-186.

Suhrcke M, McKee, M., Sauto Arce, R., Tsolova, S. and Mortensen, J. (2006), Investment in health could be good for Europe's economies, *British Medical Journal* 333: 1017-1019.

Westbrook, R.A. (1980), Consumer Satisfaction as a Function of Personal Competence/Efficacy, *Journal of the Academy of Marketing Science*, 8, 427-437.

WHO Fact sheet N°311, September 2006.

Ye, J., Marinova, D. and Singh, J. (2007), Strategic Change Implementation and Performance Loss in the Front Lines, *Journal of Marketing*, 71(October), 156-171.

Zinkhan, G.M. and K. Braunsberger. (2004). The complexity of consumers' cognitive structures and its relevance to consumer behaviour, *Journal of Business Research,* 57, 575-582.

Zinkhan, G.M. and Muderrisoglu, A. (1985), Involvement, familiarity, cognitive differentiation, and advertising recall: A test of convergent and discriminant validity. In: E.C. Hirschman and M. Holbrook (eds.), *Advances in consumer research*, 12, 356-361. Provo, UT: Association for Consumer Research.

Bibliography

Torben Hansen, Ph.D., is a Professor at the Department of Marketing, Copenhagen Business School (CBS). He is Chairman of the Consumer Research Group at CBS and Chairman of the Danish Money and Pension Panel. His main fields of research are consumer behaviour and marketing research methods. He is co-authoring the first European edition of 'Marketing Management' and his papers have appeared in various academic journals, examples include International Journal of Consumer Studies, European Journal of Marketing, Journal of Foodservice Business Research, Journal of Product & Brand Management, Journal of Consumer Behaviour, Journal of International Consumer Marketing, Journal of Euromarketing, International Journal of Retail & Distribution Management, British Food Journal, The International Review of Retail Distribution and Consumer Research, and Journal of Retailing and Consumer Services. Torben Hansen has worked as a consultant for various organisations. Recently he leads a consumer food research project funded by the Danish Agency for Science, Technology and Innovation.

Thyra Uth Thomsen is an Associate Professor at the Department of Marketing, Copenhagen Business School. Her research interests include consumer behaviour, symbolic consumption and identity construction; in particular consumers in transitions. As part of the VOICE group she currently engages in collaborative research on consumption linked to motherhood. Moreover she is engaged in a research project about food consumption funded by the Danish Agency for Science, Technology and Innovation.

Appendix

Items used to measure the constructs applied in the study

Personal food identity
X1 You are what you eat
X2 What I eat is making me who I am
X3 My diet is a central part of my identity

Unhealthy food taste belief
X4 Often unhealthy food tastes better than healthy food
X5 Healthy food is less enjoyable than unhealthy food
X6 Healthy food often has a dull taste

Food health involvement
X7 I'm usually bored when I listen to discussions about health*
X8 Eating healthy is not important to me*
X9 In general, I'm very interested in healthy food products
X10 Living a healthy life is very important to me

Food health competency
X11 Where healthy food shopping is concerned, I consider myself highly competent
X12 I find it difficult to put together a healthy meal*

Perceived food health barrier
M1 To provide for a healthy dinner is more time consuming than a less healthy dinner
M2 It's more demanding to come up with healthy dishes than less healthy ones
M3 Preparing healthy food is time demanding
M4 Undertaking a healthy diet is not demanding*

* Item inverted