Self-identity and fruit and vegetable intake

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Abstract

This research is based on the Theory of Planned Behaviour (TPB) and is focused on fruit and vegetable intake, a specific preventative health behaviour. Several reviews showed the efficacy of TPB to predict intention and behaviour in relation to food choice. The TPB affirmed that attitude, subjective norm and perceived behavioural control (PBC) influence intention, which in turn mediates their impact on behaviour. Moreover self-identity appeared as a motivational role to choose certain foods. Therefore an extended model of the TPB with the addition of self-identity as a determinant of intention its implementation was verified. Cross-sectional survey was employed with university students. The traditional components of TPB and self-identity were measured.

Results showed that the proposed measurement model revealed a good fit. The extended structural model was verified with Structural Equation Model (SEM). The model fits very satisfactorily. Attitude, PBC and self-identity were predictors of intention, instead subjective norm didn't appear as a predictor of intention. Intention showed a significant direct impact on behaviour and mediated the relationship between attitude, PBC, self-identity and behaviour. Farther, self-identity presented a direct effect on behaviour.

In the end the research hypothesis that self-identity plays a decisive role was confirmed. It would seem that whether university students identify themselves as "healthy eaters" are more likely to consume regularly five portion of fruit and vegetable.

Key-worlds: TPB, self identity, fruit and vegetable intake

Introduction

Healthy eating is an important protective factor of health. The guidelines for a healthy eating (INRAN, 2003; USDA/USDHHS, 2010) recommend the daily consumption of at least five servings of fruits and vegetables and for fresh vegetables to be varied as much as possible and

according to the seasons. This behavior can help counteract the process of premature aging of cells, that is often the origin of tumor processes.

Fruit and Vegetable consumption promotes health by providing the necessary vitamins and antioxidants (CDC, 2012) and assures substantial benefits to physical health by preventing cancers and chronic illnesses (Dauchet, Amouyel, and Dallongeville, 2009; FAO/WHO, 2003; He, Nowson, & MacGregor, 2006; World Health Organization, 2002, Ness & Powles, 1997; Block, Patterson, & Subar, 1992), and weight gain (Alinia, Hels, & Tetens, 2009; Sartorelli, Franco, & Cardoso, 2008; Yao & Roberts, 2001). The World Health Organization (2003) reported that low fruit and vegetable intake is responsible for 11% of strokes, 19% of gastrointestinal cancers and 31% of ischemic heart disease.

In Italy ISTAT (2014: Istat, Survey Aspects of Daily Life) reported that only 18.1% of the population *consumes* at least four daily servings of fruits, vegetables and fresh vegetables and that there are considerable gender differences (women reported 4.3 points difference in 2013 compared to men). Disadvantaged consumers in *the South* of Italy report lower rates of adequate fruits and vegetable consumption (14.2% in South versus 21.1% in the North of Italy; ISTAT survey Aspects of Daily Life, 2013).

Theoretical Background

The present study adopted the theory of planned behaviour (TPB; Ajzen, 1991) as a theoretical framework, since TPB constructs are the strong predictors of dietary behaviors (Conner and Norman, 2005; Armitage & Conner , 2001). Armitage & Conner (2001) indicated that the TPB model reliably explains between 40 and 50% of the variance in intention, with in turn explained between 20 and 40% of the variance in behavior.

As regards dietary behaviors, most of variability was predicted by attitude and progressively by perceived behavioral control and subjective norms (Povey et al, 1999).

In recent years studies have applied TPB model to predict fruit and vegetable intake (e.g. Kothe, Mullan, & Amaratunga, 2011; Elliott & Armitage, 2009; Blanchard, Fisher, et al., 2009; Blanchard, Kupperman, et al., 2009; De Bruijn et al., 2007; Brug, de Vet, de Nooijer, & Verplanker, 2006; Kvaavik, Lien, Tell, & Klepp, 2005; Payne, Jones, & Harris, 2005; Conner, Norman, & Bell, 2002; Kelley & Abraham, 2004; Povey, Conner, Sparks, James, & Shepherd, 2000).

Particurarly, in a review of 23 studies Guillaumie, Godin, & Vézina-Im (2010) reported that 30% to 57% of the variance in intentions (Povey et al., 2000a; Paisley & Sparks, 1998) and 6% to 32% of the variance in FVI (Conner et al., 2002; Povey et al., 2000a) were accounted by attitudes, perceived norms, and perceived behavioral control.

Other research reported that the TPB could explain 22% of the variance in FVI (Blanchard, Fisher, et al., 2009; Blanchard, Kupper- man, et al., 2009; Kvaavik et al., 2005; Payne et al., 2005).

Attitude and perceived behavioural control appears to be the strongest predictors of healthy eating intentions?? (Sjoberg et al., 2004; Povey, Conner, Sparks, James, & Shepherd, 2000b) but perceived norms often show little or insignificant relationship to healthy eating intentions (Louis, Chan, & Greenbaum, 2009; Paisley & Sparks, 1998).

Therfore there is ample empirical evidences that TPB is a useful way to understand FVI. The present research analyzes how well the TPB predicts FVI. Additional predictors to increase the predictive validity of the TPB for fruit and vegetable consumption were also included.

Self-identity appeared as a construct which assumes motivational role for certain food choices. Self-identity was defined by Spark (2000) as a relevant aspects of one's self-perception and it refers to how each one fells himself/herself as a person which accomplishes his/her societal role (Conner and Armitage, 1998). Several authors suggested self-identity as useful addition variable to the TPB (e.g. Sparks and Shepherd 1992) on the ground that subjective norms didn't always account enough variance in intentions (Ajzen, 1991; Hagger et al., 2006). Studies have indicated that this lesser role of subjective norm may be explained by its limited conceptualization that didn't entirely consider socially influences (Hagger & Chatzisarantis, 2005; Conner & Armitage, 1998)

Additionally, the predictive power of self-identity has been found over and above the effects of subjective norms (e.g. Rise, 2012; Conner and Armitage, 1998; Charng et al., 1988; Sparks and Shepherd, 1992.) and it exert an independent effect on intentions (Ries, 2010; Campbell and Sheeran, 2001; ; Conner & McMillan, 1999; Conner, et al., 1999; Charng et al., 1988; Conner and Armitage, 1998; Sparks and Shepherd, 1992). Therefore self-identity may control the decision-making process for some individuals and nullify the influence of other TPB constructs such as attitudes, subjective norms and PBC (Hagger and Chatzisarantis, 2006).

A meta-analysis focused on the prediction of intention (Ries et al., 2010) showed that self-identity is a significant predictor of intentions and behaviour which should be integrated into the TPB.

The addition of self-identity to the traditional TPB construct (attitude, subjective norms and PBC) incremented of 6% ($p < .001$) of variance in intentions.
Moreover self-identity influences the implementation of certain behaviours independently of social references and attitude(Ries, 2012). Biddle, Bank, and Slavings (1987) showed that this construct had an effect on behavior over and above the effect of individual preferences.

Method

Partecipants and study design

In March 2014, a total of 250 online questionnaires were sent to a convenience sample of university students, of which 210 were responded at T1 and 206 at T2 (58 male; 146 female; mean age = 22,91; SD = 8,33). Only the 206 subjects who responded were selected for the analyses. Students were recruited from second-year psychology undergraduates of South Italy after receiving ethical approval. The TPB questionnaire was administered following this standardized procedure: the study was explained, written consent was obtained, and the questionnaire was implemented.

Measures

The questionnaire *collected* information about measures of components of TPB and self-identity in relation to the consumption of fruit and vegetable and data about gender and age.
Intention. Intentions to eat 5 portion of fruit and vegetable per day in the next month were measured using three items on a 7-point Likert scale (Armitage and Conner, 1999). Exemples of items Examples of items for each scale are in Table 4. Alpha Cronbach values are showed in Descriptive finding table (tab.1). *Attitude*. Three items (Povey et al., 2010) were used to assess students' attitudes towards consumption of 5 portion of fruit and vegetable per day. Each adjective pairs was rated on a 7-point response format.
Subjective norm. To assess subjective norm four items were used (Armitage and Conner, 1999) through a Likert scale ranging from “strongly disagree” (1) to “strongly agree” (7).

Perceived behavioural control (PBC). Perceived behavioural control (PBC) was measured by three items (Armitage and Conner, 1999).

Self-Identity. Self-identity was measured by three items on a 7-point Likert scale (Sparks and Shepherd, 1992).

Behaviour. Frequency of daily fruit and vegetable intake (FVI) was assessed with one item one month later, so as to consider the prediction of the behavior of other considered variables. Response format were formed by 6-points ranges from 1 to more than 5 portions of fruit and vegetable per day.

Research Model

The present study attended to

- confirm the validity of a "traditional" TPB model (Aizen, 2002) to predict intention to engage a specific behaviour (fruit and vegetable consumption) and its implementation
- compare the *power* of a "traditional" TPB model to two alternative "extended" models. The first concerns the role of self-identity as an additional construct that indirectly impacts on behaviour thanks to the mediation of intention. The second is focused on the role of self-identity as another predictor of behaviour, that have also a direct impact on behaviour not mediated by intention.

Hyphotheses

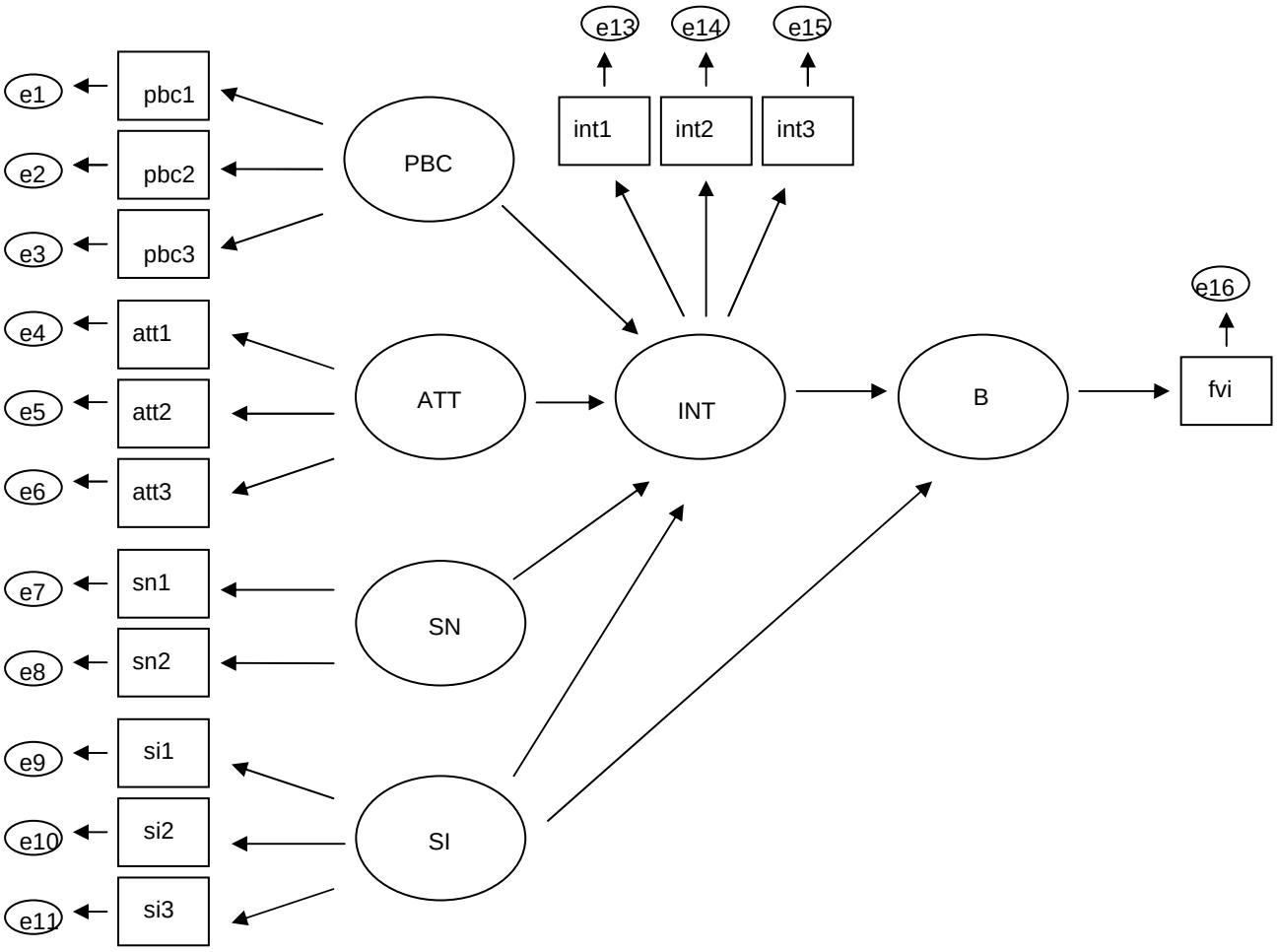
Following theoretical hypotheses is referred to all considered models (the "traditional" and the two "extended" models).

- H1: FVI Intention is predicted by attitude.
- H2: FVI Intention is predicted by perceived behavioural control (PBC).
- H3: FVI Intention is predicted by subjective norm.
- H4: FVI Intention is predicted by self-identity.
- H5: Intention mediates the relationship between perceived behaviour control and FVI.
- H6: Intention mediates the relationship between attitude and FVI .
- H7: Intention mediates the relationship between subjective norm and FVI

- H8: Intention mediates the relationship between self-identity and FVI.
- H9: Self-identity has a direct effect on FVI.

Figure 1 showed the hypothesized structural model for the study. Circles indicate latent variables, squares depict measures, numbers at the origins of arrows are error variances, numbers on arrows between latent constructs and measures are factor loadings, and numbers between latent constructs are regression parameters. The model is composed of four exogenous variables (attitudes, subjective norms, perceived behaviour control, self-identity) and two endogenous variables (intention and behaviour). Intention is hypothesized to act as a mediator between all exogenous variables and behaviour.

Figure 1. Conceptual model. The measurement model for the study based on TPB



Design and data analysis

All descriptive analyses were performed using PASW 17 and Mplus 7 statistical software was used to conduct structural equation modelling (SEM). In contrast to multiple regression, SEM allows to use latent variables, to examine the impact of numerous variables on other variables, to confront theoretically competing models (Hankins et al., 2010). Adequacy of the SEM models were estimated by using Chi-Square and recommended incremental goodness-of-fit indexes: the root mean square error of approximation (RMSEA), the comparative fit index (CFI), the Tucker-Lewis Index (TLI) and the Standardized Root Mean Square Residual (SRMR; Iacobucci 2010).

The literature suggest that a not significant Chi-Square indicates that the model fits the data well (Weston and Gore, 2006). CFI and TLI cut-off values of .90 are generally considered to represent acceptable fit (Bentler, 1990; Tucker and Lewis, 1973). Browne and Cudeck (1989) suggest that a RMSEA value of 0.05 or less indicates good fit, and that values up to 0.08 represent errors that approximate to those expected in the population. Values of the SRMR less than .08 are generally considered favourable (Hu and Bentler, 1999).

Results

Descriptive results (mean, standard deviation and Cronbach Alpha) is reported in table 1.

Should be noted that fruit and vegetable consumption in this population was lower than the recommended daily intake of fruit and vegetable.

Cronbach Alpha ranged from 0.75 and 0.95 (table 1). Therefore, the reliability of the constructs was confirmed according with the suggested values of above 0.7 (Nunnally, 1970).

Table 2 showed correlation results.

Table 1: Descriptive finding of study variables

Variable	Name	No of items	Mean (st.dev)	Cronbach Alpha
Endo 1	FVI	1	3.35 (1.30)	0.95
Endo 2	Intention	3	4.39 (1.71)	0.78
Exo 1	Attitude	3	6.31 (0.98)	0.75
Exo 2	Subjective norm PBC	2	5.28 (1.38)	0.76
Exo 3	Self-identity	3	4.93 (1.44)	0.84
Exo 4	Behaviour	3	4.83 (1.30)	

Table 2 : Correlations between study variables

	1.	2.	3.	4.	5.	6.
1. Intention	1					
2. Attitude	0.36**	1				
3. Subjective norm	0.19**	0.33**	1			
4. PBC	0.65**	0.27**	0.20**	1		
5. Self-identity	0.47**	0.20**	0.08	0.47**	1	
6. FVI	0.36**	0.16**	0.11	0.37**	0.27**	1

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

Measurement and structural model

As regard the result of distributional properties of all items, high value of skewness revealed that not all variables were normally distributed. Therefore, the *MLR* procedure was used as estimation method.

To test the construct validity a CFA of measurement of traditional model (Model 1, table 3) and extended model (Model 2, table 3). The models revealed a good fit. The chi-square were significant, but all the other indices pointed to a very good fit. The parameter estimates were all significant and presented higher values (table 4).

Considering that if the sample were small, the Chi-Square statistic might not differentiate between good or poor fitting models (Kenny and McCoach) and all other indices indicated a good fit, measurement models waere accepted as a model with acceptable good fit. None model modification was made and throughout a conservatory strategy the freeing of cross-loadings was not allowed, according with Hair et al (2006), whom suggested that their presence affect the construct validity.

Three mediation analyses was performed to evaluate the "traditional" model (Model 3), the first "extended" model in which self-identity was added as a predictor of intention with only with an indirect effect on behaviour mediated by intention (Model 4), the second "extended" model (Model 5), in which self-identity were also considerated as a construct that presents a direct effect on behavior (table 3).

The results of Model 3 indicated good fit, except to RMSEA value that was more than 0.05 (Browne and Cudeck, 1989). Intention was significantly determined by PBC (β = 0.60) and attitude (β = 0.18), but not by subjective norm. FVI was determined by intention (β = 0.33). Levels of explained variance were significant for intention and behaviour (respectively R^2 = 0.46, 0.11),

The findings of Model 4 reported a bad fit. Chi-Square was significant and Chi-Square/degrees of freedom ratio exceeded maximum value. Since it was worse than the traditional model (Model 2)., it has been rejected.

The second extended model (Model 5), in which self-identity was considered as a predictor both of intention and behaviour, fits better than traditional model. Intention was significantly determined by PBC (β = 0.52), attitude (β = 0.17), self-identity (β = 0.18) but not by subjective norm. In this case, fruit and vegetable consumption was determined more by self-identity (β = 0.30) than by intention (β = 0.20). Direct effect of self-identity on behaviour was 0.29. Values of explained variance for intention were R^2 = 0.49 and for behaviour R^2 = 0.18. Standardized estimated results was showed in figure 2.

Partial mediation results for Model 3 and 5 are presented in table 5.

Table 3. Fit statistics for measurement and structural models

Model	Chi-Square	Df	Chi-Square/df	RMSEA	CFI	TLI	SRMR	R2 INT	R2 FVI
Model 1	65.58	38	1.72	0.06	0.96	0.95	0.045		
Model 2	117.97	76	1.53	0.048	0.97	0.96	0.042		
Model 3	6.39	3	2.13	0.074	0.97	0.93	0.030	0.46	0.11
Model 4	20.83**	4	5.21	0.14*	0.87	0.72	0.052	0.40	0.11
Model 5	3.54	3	1.18	0.030	0.996	0.988	0.017	0.49	0.18

Note: Model 1: Measurement model with traditional variable (attitude, subjective norm, PBC, intention and FVI). Model 2: Measurement model with traditional variable and self-identity. Model 3: Traditional structural model (attitude, subjective norm, PBC, intention and FVI). Model 4: Extended structural model (adding self-identity as determinant of intention). Model 5: Extended structural model (with self-identity as predictor of intention and FVI). * p < .05. ** p < .01.

Table 4: Parameter estimates of traditional and extended measurement model

Variable	Code	Attributes	Factor Loadings Model1	Model2
Factor 1: ATT Attitude (3 items)	A T T 1	If I were to eat a diet based on the consumption of 5 portions of fruit and vegetables a day over the next month, it would be: bad – good.	0.78	0.78
	A T T 2	If I were to eat a diet based on the consumption of 5 portions of fruit and vegetables a day over the next month, it would be: unfavourable – favourable.	0.68	0.68
	A T T 3	If I were to eat a diet based on the consumption of 5 portions of fruit and vegetables a day over the next month, it would be: negative – positive.	0.81	0.81
Factor 2: SN Subjective norm (2 items)	S N 1	People who are important to me think I should eat a diet based on the consumption of 5 portions of fruit and vegetables a day over the next month2	0.64	0.65
	S N 2	People who are important to me would approve of my eating diet based on the consumption of 5 portions of fruit and vegetables a day over the next month	0.96	0.96

Factor 3: PBC Perceived behavioural control (3 items)	P B C 1	How much personal control do you feel you have over eating a diet based on the consumption of 5 portions of fruit and vegetables a day in the next month?	0.66	0.66
	P B C 2	I believe I have the ability to eat a diet diet based on the consumption of 5 portions of fruit and vegetables a day in the next month.	0.79	0.77
	P B C 3	If it were entirely up to me, I am confident that I would be able to eat a diet based on the consumption of 5 portions of fruit and vegetables a day in the next month.	0.69	0.70
Factor 4: Intention (3 items)	I N T 1	I intend to eat a diet based on the consumption of 5 portions of fruit and vegetables a day over the next month.	0.94	0.97
	I N T 2	I plan to eat of 5 portions of fruit and vegetables a day over the next month.	0.90	0.92
	I N T 3	I want to eat 5 portions of fruit and vegetables a day over the next month.	0.92	0.90
Factor 4: SI Self-identity (3 items)	SI1	I think myself as a healthy eater.	0.74	
	SI2	I think myself as someone who is concerned with healthy.	0.91	
	SI3	I think myself as someone who is concerned with the health consequences of what I eat.	0.77	

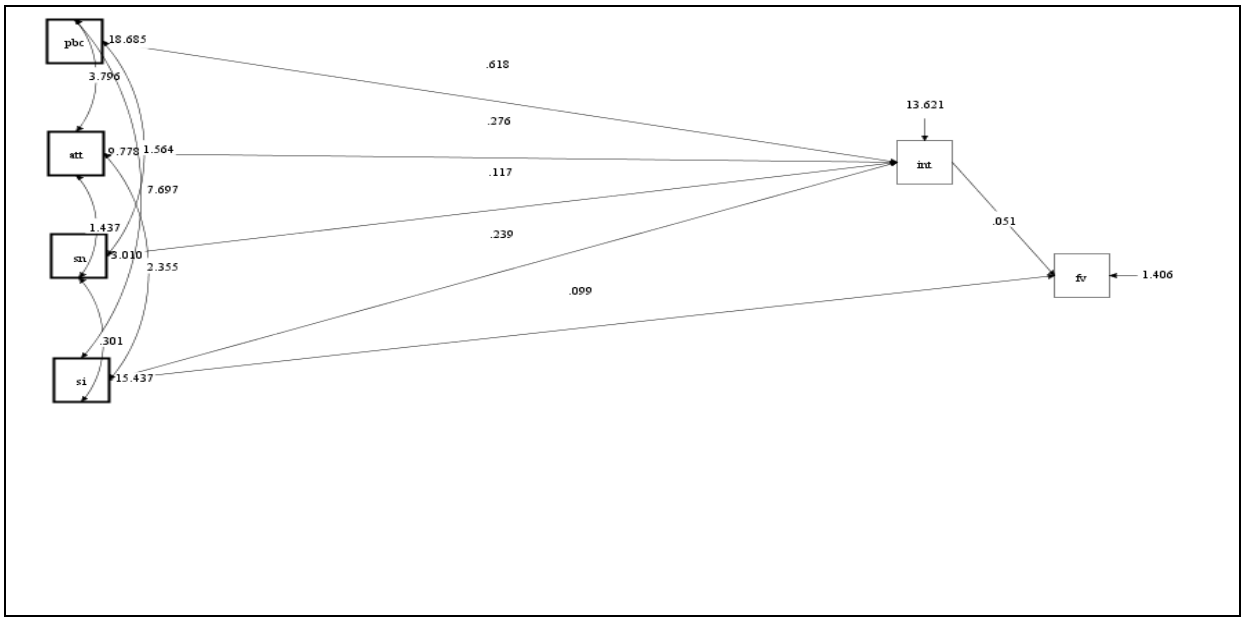
Note: The standardized results was reported**.**

Table 5: Partial mediation results

Model 3					
	Mediated	Endogenous	Path	Indirect Effect Estimate	Mediation Hypothesis
PBC	Intention	Behaviour	PBC -> Intention -> Behaviour	0.20**	Mediating
Attitude	Intention	Behaviour	Attitude -> Intention -> Behaviour	0.061**	mediating
Subjective norm	Intention	Behaviour	Subjective norm -> Intention -> Behaviour	0.009	Not mediating
Model 5					
PBC	Intention	Behaviour	PBC -> Intention -> Behaviour	0.10	Mediating
Attitude	Intention	Behaviour	Attitude -> Intention -> Behaviour	0.034	Mediating
Subjective norm	Intention	Behaviour	Subjective norm -> Intention -> Behaviour	0.008	Not mediating
Self-identity	Intention	Behaviour	Self-identity -> Intention -> Behaviour	0.037	Mediating

Note: The standardized path estimated was reported.

Figure 2: Extended model. Standardized estimated results.



Discussion of results and conclusion

In the "traditional" model attitude, perceived behavioural control and self-identity were predictors of intention. Consequently H1 and H2 were confirmed. Subjective norm construct didn't appear as a predictor of intention, therefore H3 was rejected.

These findings are consistent with the literature, which report that attitude and perceived behavioural control are the more important predictors of healthy eating (Sjoberg et al., 2004; Povey, Conner, Sparks, James, & Shepherd, 2000b) and that perceived norms shows law or not significant relationship to healthy eating (Louis, Chan, & Greenbaum, 2009; Paisley & Sparks, 1998; Lien et al., 2002).

Similarly to the studies of Murnaghan et al. (2009) and of Blanchard et al. (2009), in which the traditional model explained 50% of the variance in intention, the traditional model in this study explained the 46% of variance in intention. Particurarly, the subjective norm appeared not significant as in the second study, but in opposition of first study.

Furthermore, according to Blanchard et al. (2009), intention significantly predicted the FVI accounting for 11% of its variance.

The first “extended” model, showed that self-identity, considered as a determinant of intention, had an indirect impact on behaviour, likewise PBC and attitude. Nevertheless these results, the model fit worse than the “traditional” and for this it was refused.

The second “extended” model, in which self-identity was considered as a determinant of intention, fit better than the traditional, intention of daily consumption of five portion of fruit and vegetable was predicted by PBC, attitude and also by self-identity. Therefore, in this case H1, H2 and H4 was confirmed.

As regard the mediation of intention, in the “traditional” model it mediated the relationship between the perceived behavioural control, attitude and the behaviour, but its mediation on behaviour wasn’t significant for subjective norm. (H5 and H6 were substantiate, but H7 should be disconfirmed.)

Intention presented the same power of mediation between constructs (attitude, subjective norm, PBC and self-identity) in the first “extended” model, in which self-identity was only considered as a determinants of intention; but this model was statistically rejected for its lack of good fit. Specially, H8 (Intention mediates the relationship between self-identity and behaviour) could not be confirmed. In the case of the second “extended” model all the predictive and mediation power of intention remained (confirming H5, H6, H7, H8) and also H9 could be confirmed: self-identity showed a direct effect on behaviour; its impact was not only mediated by intention in predicting daily fruit and vegetable intake.

This work showed that self-identity was also a strong predictor of intention, increasing the variance explained in intention and behavior (respectively 49 % and 18), compared to the traditional model that didn’t add this variable. According with the results of a review of Sparks (2000), the addition of self-identity yielded a stronger model fit, confirming the decisive role of this constructs also in the application of TPB for predicting FVI. Individuals who perceived them- selves as a typical healthy eaters were more likely to intend to eat more fruit and vegetables in the future.

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