



# Understanding and modelling vegetables consumption among young adults



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## ABSTRACT

Vegetables consumption is decreasing among young people in Italy. This paper aims to understand the main determinants of vegetables consumption among young adults to suggest possible intervention strategies to promote it. A cross-sectional study was conducted on a samples of Italian students ( $n = 751$ ), using the theory of planned behaviour (TPB) as a conceptual framework. A structural equation modelling (SEM) was used to test the TPB predictors for eating at least two servings of vegetables per day next week, and multi-group analysis to assess the moderating effect of habits. The self-reported mean consumption was three servings of vegetables per day, but individuals reporting low habits consumed a lower number of servings and reported lower frequency of consumption. The TPB model explains 81% of intentions and 67% of behaviour variance. Intention significantly affects vegetable eating behaviour in participants with low habits, while for high habits group perceived control is the main behaviour predictor. This indicates that vegetable consumption may be intentional as well as habitual, depending on the level of habit strengths. Possible intervention strategies based on the relevant behavioural, normative and control beliefs are discussed.

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## 1. Introduction

Fruit and vegetables (F&Vs) are important elements for a healthy, balanced daily diet, preventing a number of chronic diseases, including hypertension, cardiovascular disease, type 2 diabetes, certain cancers and musculoskeletal disorders (FAO/WHO, 2004; European Food Information Council, 2012; OECD, 2014). The World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO) recommended the intake of a minimum of 400 g of F&Vs per day (FAO/WHO, 2004). Several countries have translated this target into the 'Eat 5 servings of fruit or vegetables each day' message (in short: "5 A Day"). However, several EU member states fail to meet this F&Vs intake. Household data show that total F&Vs consumption ranged from 577 g/day in Poland to 196 g/day in Iceland, and vegetable consumption varied from a minimum of 109 g/day in Norway to a maximum 284 g/day in Cyprus (European Food Information Council, 2012). Given these large discrepancies among European countries, the European Commission is monitoring the

consumption of F&Vs as one of a number of ways to offset a worsening trend of poor diets in Europe (OECD, 2014).

In Italy, which reported in 2008 the second F&Vs intake in Europe (452 g/day) and the highest consumption of processed vegetables (56 g/day) (European Food Information Council, 2012), the picture changed rapidly in recent years. In 2014 the estimated annual F&Vs intake was lower than 360 g/day, and the drop in per capita consumption affected both fruit and vegetables. Moreover, older people more commonly eat vegetables daily, whilst consumption is lowest among young people aged 15–24 years: only 45% of the Italian population between 20 and 24 years consumes at least one portion of vegetables per day (Zucconi, 2015). This is in accordance with observations of a general moving away from the Mediterranean diet of many countries in the Mediterranean area (Dermeni et al., 2013; Mistretta et al., 2016). Traditionally, dietary patterns of young population from Italian Northern regions are less adherent to the Mediterranean diet, therefore characterized by a lower consumption of vegetables, compared to the Southern regions (Donati et al., 2016; Noale et al., 2014; Santomauro et al., 2014). It has also been observed in several Mediterranean countries that inhabitants of urban areas are less likely to be adherent to traditional dietary patterns than those living in rural areas (Dermeni et al., 2013; Mistretta et al., 2016). An improved adherence to the

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Mediterranean diet of young people, associated with a higher vegetable consumption, is related to several factors including having lunch at school, breakfast with family, availability and liking of vegetables, living in rural environment, higher cultural level and socio-economic status of parents. Moreover, lifestyle habits and parental modelling have been reported to influence adolescents' vegetable consumption (Grosso et al., 2013b, 2013a; Roccaldo et al., 2014). Hence, understanding young adults' drivers regarding vegetable eating, in a context of declining consumption, could facilitate the design of interventions to increase vegetable intake in the young population.

## 2. Theoretical framework and research hypothesis

The present study uses the theory of planned behaviour (TPB) (Ajzen, 1991) to explain and test the main determinants of vegetables consumption among young adults in Italy. The TPB postulates that attitude toward the behaviour (favourable or unfavourable evaluation of the behaviour), subjective norm (perceived social pressure), and perception of behavioural control (PBC, perceived ability to perform the behaviour) lead to the formation of a behavioural intention, and that intention is the immediate antecedent of behaviour (Ajzen, 1991). Intention captures the motivational factors that influence behaviour: given a sufficient degree of actual control over the behaviour, people should carry out their intentions when the opportunity arises. According to the TPB, human social behaviour is guided by considerations regarding a behaviour's likely consequences (behavioural beliefs), by perceived opinions of the social environment (normative beliefs), and by one's perceptions of barriers and facilitators when attempting to perform a behaviour (control beliefs) (Fishbein & Ajzen, 2010). Interventions to changing intention and behaviour should target the relevant behavioural, normative and control beliefs.

Prior applications of the TPB in predicting vegetable consumption suggest that attitude, subjective norms and PBC explain 31% of the variance in intention and 10% of the variance in vegetable intake (Guillaumie, Godin, & Vézina-Im, 2010). Individual's beliefs about consequences, capabilities and social influences were significant predictors of intention, whilst intentions and beliefs about capability (PBC) significantly affected vegetables intake. Therefore, this study suggests that:

- H1.** A favourable attitude would significantly predict intention to consume vegetables.
- H2.** Subjective norms would significantly predict intention to consume vegetables.
- H3.** PBC would significantly predict intention to consume vegetables.
- H4.** Behavioural intentions would significantly predict the behaviour, i.e. vegetables consumption.
- H5.** PBC would significantly predict the behaviour.

Although the TPB has been satisfactorily applied in predicting intentions and behaviour in many fields (Armitage & Conner, 2001; Conner & Sparks, 2005), including health-related behaviour (McEachan, Conner, Taylor, & Lawton, 2011), it may not necessarily capture all of the predictors of more complex behaviour such as food choices (Kothe & Mullan, 2014). For food purchases, behaviour may not only be the resultant of planned intentions, but it may also become habitual. Habit is a psychological construct involving repetition, automaticity and expression of one's identity (Verplanken & Orbell, 2003). Several studies have shown its relevance in F&Vs consumption (Allom & Mullan, 2012; De Bruijn,

2010; De Bruijn et al., 2007; Godin et al., 2010; Guillaumie et al., 2010; Menozzi & Mora, 2012), and in other food-related behaviours (e.g., Honkanen, Olsen, & Verplanken, 2005; Menozzi, Halawany-Darson, Mora, & Giraud, 2015). Habits were modelled as moderator between intention and behaviour, as emerged in other studies considering fruit consumption (De Bruijn, 2010; De Bruijn et al., 2007) and other healthy activities such as physical activity (van Bree et al., 2013). Moderator effect implies that the casual relation between two variables changes as a function of the moderator variable (Baron & Kenny, 1986, p. 1174). Therefore, a measure of habits was added to the model suggesting the following hypothesis:

- H6.** Habits would have a role in moderating the intention-behaviour relations.

Therefore, this paper aims to confirm (1) the TPB model predictors for vegetable consumption among young adults in Italy, and (2) the role of habits as moderating the intention-behaviour relations. The relevant beliefs are also analysed to help in defining targeted interventions.

## 3. Material and methods

### 3.1. Data collection and sample

The sample consisted of 823 undergraduate students. Students were recruited from the University of Parma (Northern Italy) in order to meet the University of Parma quota of areas of study (social, scientific and sanitary) and gender. Data were collected during June and July 2013 with face-to-face interviews performed by three trained and experienced interviewers who submitted the TPB questionnaire to those who consented. All respondents participated in a lottery; five of them won a prize of 50 Euros. Excluding the incomplete questionnaires, the final sample consisted of 751 students, 55% of which are females. The mean age is  $22.1 \pm 2.6$  years. Approximately two third of the respondents hail from Northern Italy, 5% from Central Italy, 27% from Southern Italian regions, and only three students from foreign countries. The areas of study are social (45%), scientific (31%) and sanitary (24%) (Table 1).

### 3.2. Measures and statistical analysis

The questionnaire items were defined following Ajzen's conceptual and methodological considerations (Fishbein & Ajzen, 2010). The targeted behaviour was "Eating at least 2 servings of vegetables per day next week". Potatoes and other starchy roots were excluded following the WHO definition of vegetables. A preliminary qualitative study was conducted with one focus group and in-depth personal interviews with undergraduate university students to elicit salient beliefs connected to vegetable consumption.

The TPB items were scored on a 7-point Likert scale. *Attitude* toward the behaviour was assessed with four semantic differentials (e.g., "Eating at least 2 servings of vegetables per day next week is bad/good"). *Behavioural beliefs* regarding the outcomes of the behaviour were "Feeling better", "Having more energy", "Having higher control over weight", and "Being healthier in the future". Two measures of *subjective norms* were used (e.g., "Most people who are important to me think that I should/I should not eat at least 2 servings of vegetables per day next week"). *Normative beliefs* that a particular referent individual of group thinks respondents should or should not perform the behaviour were included, with reference to "Friends", "My family", "Family doctor" and "Food industries and retailers". *PBC* was measured with two items (e.g., "I think that eating at least 2 servings of vegetables per day next week is

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