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Article — Published Version

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New Medit

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Suggested Citation: Essakkat, Kaouter; Mattas, Konstandinos; Unay-Gailhard, Ilkay; Baourakis, George (2021) : Youth's potential of adopting the Mediterranean diet lifestyle in response to climate change: Empirical study in Crete, Greece, New Medit, ISSN 2611-1128, Bononia University Press, Bologna, Vol. 20, Iss. 5, pp. 85-95,
<https://doi.org/10.30682/nm2105f>

This Version is available at:

<https://hdl.handle.net/10419/251214>

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Youth's potential of adopting the Mediterranean diet lifestyle in response to climate change: Empirical study in Crete, Greece

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DOI: 10.30682/nm2105f

JEL codes: D12, Q13, Q18

Abstract

The Mediterranean diet is considered one of the healthier and most balanced dietary models currently in existence. Different studies suggest that it is environmentally friendly: it combines low greenhouse gas emissions, low demand of soil water and less deforestation. Climate change can be mitigated through what consumers decide to eat. This article addresses the issue of by studying the intention of young consumers to shift their diets towards the Mediterranean Diet to prevent climate change through face interviews, collected in Crete, Greece (N=287). Using the Theory of Planned Behavior, the objective is to identify whether attitudes, subjective norms and perceived behavioral control guide such a behavior. Our findings highlight that young consumers' perceived behavioral control have the highest influence on the intention, followed by their attitudes. As for the subjective norms, it has no significant impact on the intention.

Keywords: Young consumers, Mediterranean Diet, Climate change, Theory of Planned Behavior, Greece.

1. Introduction

Food production is an important conductor of environmental pressures, in particular climate change, through greenhouse gas emissions, land use and water use. On the opposite side, climate change has major impacts on food security worldwide: the stability of the food systems can be at risk under climate change because of variability in supply. Hence, climate change and the food sector hold a reciprocal harmful relationship that

needs to change in order to ensure fewer negative impacts on both environment and food security. Climate change can be mitigated not only by changing the production and distribution process, but also through what consumers decide to eat. From an environmental perspective, what a person chooses to eat makes a big difference (Marlow *et al.*, 2009). Therefore, a global dietary transformation is urgently needed, this transformation can take the shape of a new dietary pattern. The

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Table 1 - Consumer behavior in an environmental context using pro-environmental behavior, self-determination theory and consumers' attitudes.

<i>Article</i>	<i>Theory used</i>	<i>Main objective</i>	<i>Behavioral model</i>	<i>Findings</i>
Exploring the Adherence to the Mediterranean Diet and Its Relationship with Individual Lifestyle: The Role of Healthy Behaviors, Pro-Environmental Behaviors, Income, and Education (Cavaliere <i>et al.</i> , 2018)	Pro-environmental behavior	To examine whether there is a relationship between individuals' healthy and pro-environmental behaviors and their level of adherence to the MD and to explore the role of consumer income and education.	Structural Equation Modelling (SEM)	The Mediterranean Diet is part of a sustainability-oriented lifestyle and stress the key role of both income and education in affecting adherence to MD. Future policy aimed at contrasting the gradual disappearance of the MD should emphasize the sustainable dimension of the MD, meanwhile reducing socio-economic disparities among different population segments.
Fostering more sustainable food choices: Can Self-Determination Theory help? (Schösler <i>et al.</i> , 2014)	Protection-Motivation theory	To examine whether Self-Determination Theory can be of help in fostering more sustainable food choices by taking a closer look at the relationship between food-related types of motivation and different aspects of meat consumption.	Multi-dimensional scaling (PROXSAL), Principal component Analysis	Self-Determination Theory appeared to be useful for studying why consumers can be motivated to make more sustainable food choices and also why these preferences are not shared by all consumers.
Flemish consumer attitudes towards more sustainable food choices (Vanhonacker <i>et al.</i> , 2013)	Consumers' attitudes	Explore the attitudes of Flemish consumers towards more sustainable food choices	Exploratory factor analysis, Bivariate analyses, Cross-tabulations, K-means cluster	Many consumers underestimate the ecological impact of animal production. Well-known alternatives such as organic meat, moderation of meat consumption and sustainable fish are accepted, although willingness to pay is clearly lower than willingness to consume. Opportunities of introducing insects currently appear to be non-existent.

world needs to change current dietary patterns towards one that is more environmentally-friendly. It has been proven that plant-based diets present a great alternative to ensure both a healthy and an eco-friendly lifestyle. The Mediterranean Diet, one of the most famous plant-based diets, can be a great preventative measure against climate change (Meybech *et al.*, 2013). However, the adherence to this diet is considered quite low these last years, especially for young adults (Kyriacou *et al.*, 2015). Globalization has caused the socio-cultural-food habits to become uniform, abandoning the traditional food of the Mediterranean. Thus, it is important to study whether the young generation is ready to shift to the Mediterranean Diet to prevent climate change, and the factors that influence their intention for such a behavior. Understanding sustainable consumer behavior is crucial to any paradigm shifts in how society

approaches environmental problems, especially among young consumers, as it is deemed crucial to intervene in the formation and routinization of mainstream unsustainable consumption practices and patterns.

Various theories are applied in order to understand sustainable behavior in an environmental context, as well as the factors behind it as can be seen Table 1 below.

However, the most frequently employed theory is the Theory of Planned Behavior (TPB) as can be seen in Table 2 below. It has been designed to predict and explain human behavior in specific contexts, the central factor of TPB is the individual's intention to perform a given behavior. Intentions are assumed to capture the motivational factors that influence a behavior; they indicate how hard people are willing to try, and how much of an effort they are planning

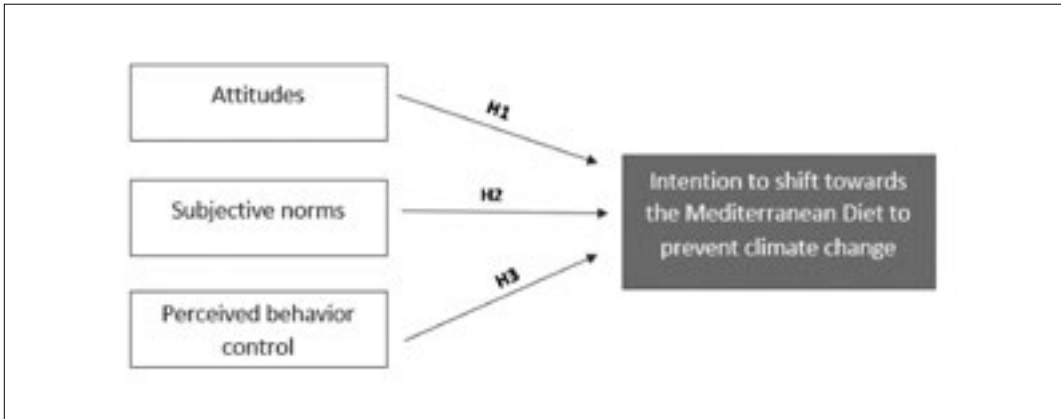
Table 2 - Consumer behavior in an environmental context using the TPB.

<i>Article</i>	<i>Main objective</i>	<i>Behavioral model</i>	<i>Findings</i>
Factors affecting consumer attitudes towards food products with sustainable attributes (Annunziata and Scarpato, 2014)	Investigate the factors affecting consumers' attitudes towards food products with sustainable attributes.	Principal factor analysis	Only attitude and social norms influenced consumers' intention. However, despite the positive attitude, shown by the consumers to products characterized by sustainability attributes, there are still several factors that limit the transformation of this attitude in the real acts of purchase
Predicting green product consumption using theory of planned behavior and reasoned action (Paul <i>et al.</i> , 2016)	Validate TPB to predict consumers' green product purchase intention.	SEM	Consumer attitude and PBC significantly predicts purchase intention whereas subjective norm does not.
Climate change issue and theory of planned behavior: relationship by empirical evidence (Masud <i>et al.</i> , 2016)	Find out if attitudes toward climate change, subjective norms, and PBC have significant associations with behavioral intention to adapt to climate change and adopt pro-environmental behavior.	SEM	Attitudes, subjective norm and PBC have positive influence on behavioral intention to adapt/mitigate climate change. The result also found mediating effects of behavioral intention between attitudes, subjective norms and PBC and pro-environmental behavior.
Is sustainability knowledge half the battle? An examination of sustainability knowledge, attitudes, norms, and efficacy to understand sustainable behaviours (Heeren <i>et al.</i> , 2016)	Examine the relationship of sustainability knowledge to pro-environmental behavior.	Bi-variate correlation	Results indicate that knowledge had a significant correlation with behavior ($r = 0.113$, $p < 0.001$). However, when controlling for TPB variables (attitudes, norms and PBC), knowledge was not a significant predictor of behavior.
Investigation and recommendations on the promotion of sustainable consumption behavior among young consumers in Thailand (Vantamay, 2018)	Investigate sustainable consumption behavior (SCB) and its determinants among undergraduate youths in Thailand.	Descriptive statistics and multiple regression analysis	The three independent variables derived from TPB (Attitude toward the behavior, Subjective norm, and PBC) can co-predict the intention to perform SCB at 31.1 percent and sustainable consumption behavior at 22.3 percent. For intention, PBC had the most influence ($\beta = .382$), followed by Attitude toward the behavior ($\beta = .302$), and Subjective norm ($\beta = .228$), respectively.

to exert, in order to perform the behavior. As a general rule, the stronger the intention to engage in a behavior, the more likely should be its performance (Ajzen, 1991). TPB presents three independent determinants of intention. First is the attitude towards the behavior, which refers to the level to which a person evaluates the behavior in question (favorable/unfavorable). The second factor is a social one, called subject norms; it refers to the perceived social pressure to perform or not to perform the behavior. The third is the degree of Perceived Behavioral Control (PBC) which refers to the perceived

ease or difficulty of performing the behavior in question and it is assumed to reflect past experience as well as anticipated impediments and obstacles. As a general rule, the more praising the attitude and subjective norm with respect to a behavior, and the greater the PBC, the stronger an individual's intention to perform the behavior under consideration. The theory of planned behavior distinguishes between behavioral intention and actual behavior. This is important in an environmental context, because intentions do end up with the desired effect on the environment such as carbon dioxide.

Figure 1 - Conceptual framework.



TPB has been shown to be effective when studying intention among young consumers (Annunziata and Scarpato 2014; Paul *et al.*, 2016; Masud *et al.*, 2016; Heeren *et al.*, 2016; Vantamay, 2018). Hence, it will be used for this article to understand young consumers' intention to shift towards the Mediterranean Diet to prevent climate change.

In this article, we have decided to test each of the constructs of the TPB independently to see which one influences young consumers' intention and which one does not.

- Based on the findings of Masud *et al.*, 2016 and Annunziata and Scarpato, 2014, we have established our first hypothesis which states that 'Consumers' attitudes have a significant impact on young consumers' intention to shift towards the Mediterranean Diet to prevent climate change' (H1).
- Based on the findings of Masud *et al.*, 2016 and Annunziata and Scarpato, 2014, we have established our second hypothesis which states that 'Subjective norms have a significant impact on young consumers' intention to shift towards the Mediterranean Diet to prevent climate change' (H2).
- Based on the findings of Vantamay, 2018, we have established our third hypothesis which states that 'PBC has the most important significant impact on young consumers' intention to shift towards the Mediterranean Diet to prevent climate change' (H3).

2. Methods

2.1. Site selection

In the "Seven Country Study" that was conducted by Ancel Keys (Keys, 1995), the Greek island Crete's diet is defined as the healthiest Mediterranean Diet, hence, we have chosen to conduct our research in this specific area that is globally known as a reference for the Mediterranean Diet.

2.2. Target population

Since the adherence to the Mediterranean Diet by young consumers in Greece has been declining these last years (Kyriacou *et al.*, 2015), we have chosen to focus on this specific group, especially consumers between the ages of 18 and 30 to study the factors that influence their behavior.

Based on the consumers' survey conducted by a national cooperative supermarket chain (SYNKA, 2020), young people in the area of Crete and more particularly in the area of Chania reveal preferences for:

- Fresh local vegetables, tomatoes and cucumbers;
- Dairy products with authentic taste and odor;
- Olive oil, especially organic extra virgin produced locally;
- Wine, all national wine types and brands;
- Energy drinks, with an abundance in consumption.

Table 3 - Reliability check.

<i>Variable</i>	<i>Item</i>	<i>Corrected Item-to-total correlation</i>	<i>Cronbach's α</i>
Attitudes	Att1	0.491	0.711
	Att2	0.141*	
	Att3	0.378	
Subjective norms	SN1	0.593	0.788
	SN2	0.676	
	SN3	0.621	
PBC	PBC1	0.283*	0.724
	PBC2	0.447	
	PBC3	0.493	
	PBC4	0.338	
Intention	Int1	0.107*	0.791
	Int2	0.522	
	Int3	-0.161*	
	Int4	0.437	
	Int5	0.620	
	Int6	0.577	
	Int7	0.445	

2.3. Sampling size

Sample size calculation was carried out based on the assumptions given in the psychometric literature, and the necessary sample size of 190 subjects according to Farmakis (Farmakis, 2009); however, we were able to collect 287 responses, 236 responses among our age range.

2.4. Questionnaire designing and reliability checking

A self-constructed questionnaire was used for the survey. Each construct of the TPB had multiple items according to the suggestion by Azjen (1985). A five-point Likert-type scale (1 strongly disagree; 5 strongly agree; 3 neither agree nor disagree) was used to measure the young consumers' responses to the TPB constructs, with higher scores indicating greater intention to shift towards the Mediterranean Diet for climate issues, stronger attitudes to the Mediterranean Diet, greater perceptions of social pressures, and higher perceived control over the behavior. The questionnaire starts with a definition of the Mediterranean Diet, to inform the respondents about its main components. Among the constructs, Intention consisted of items that aimed to measure the students' planned behav-

iors regarding the shift towards the Mediterranean Diet to prevent climate change, as well as lowering their meat consumption (e.g., I expect to follow the Mediterranean Diet in the future because of its positive environmental contribution); Attitudes included items that aimed to explore the consumers' evaluations of the shift towards the Mediterranean Diet to prevent climate change (e.g., Shifting towards the Mediterranean Diet to prevent climate change is a good idea); SN comprised of items that measured the students' perceptions of the societal responses to their decision of shifting towards the Mediterranean Diet (e.g., approval from the most important persons in their lives); and PBC contained items that expected to reveal the consumers' perceptions of the ease or difficulty related to shifting towards the Mediterranean Diet (e.g., availability and affordability of the Mediterranean Diet). Before conducting the main survey, a qualitative test was carried out asking 10 individuals from the population about the understandability and the question wording to improve the questionnaire. However, it should be noted that the measuring items on the Likert-type scale used in the study were all self-constructed since there were no comparable studies that used the TPB model to explain consumers' related behavioral intentions.

Table 4 - Means, standard deviations, kurtosis and skewness of the factors.

<i>Variables</i>		<i>Means</i>	<i>Standard deviation</i>	<i>Kurtosis</i>	<i>Skewness</i>
Attitudes	Att1	3.56	1.160	-.294	-.618
	Att3	3.81	1.132	.184	-.888
Subjective norms	SN1	3.79	1.364	-.456	-.887
	SN2	3.70	1.246	-.299	-.805
	SN3	3.61	1.200	-.377	-.610
PBC	PBC2	3.44	1.303	-.859	-.423
	PBC3	3.32	1.216	-.850	-.237
	PBC4	3.51	1.143	-.851	-.239
Intention	Int2	3.20	1.199	-.793	-.295
	Int4	3.72	1.174	-.481	-.633
	Int5	3.18	1.287	-1.074	-.075
	Int6	3.37	1.397	-1.127	-.410
	Int7	3.79	1.279	-.541	-.735
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	Int6	3.37	1.397	-1.127	-.410
	Int7	3.79	1.279	-.541	-.735

We established scale reliability through computation of Cronbach's α using SPSS 23.0. As depicted in the following table, item-to-total statistics revealed that four items (Att2, PBC1, Int1 and Int3) did not meet the threshold value of 0.3 (Nurošis, 1993); thus, they were deleted for further analysis. Excluding these two variables, Cronbach's α of all constructs were found greater than the threshold of 0.7 (Nunnally, 1994) for basic research (Nunnally, 1967).

2.5. Data analysis: Confirmatory factor analysis model

The hypotheses were tested with confirmatory factor analysis (CFA) using AMOS version 26.0 (Arbuckle, 2017). Confirmatory factor analysis is useful for simultaneous testing of multiple sets of associations between variables. The hypothetical structural model was tested with CFA using the Maximum Likelihood Method because all variables were normally distributed (skew-

ness and kurtosis were between -2 and $+2$, see George and Mallery, 2010). There were no missing data. The Table 4 below justifies the normal distribution of our data through highlighting the means, standard deviation, kurtosis and skewness of our variables.

With a chi-square higher than the degrees of freedom, the model is over-identified. Therefore, a confirmatory factor analysis (CFA) can be done. Based on the CFA tests, all three dimensions had adequate model-to-data fit: a normal chi square of 120.797, RMSEA of 0.069 and GFI of 0.925. Therefore, the model is an absolute fit model. As for incremental fit parameters, the model also presents NFI of 0.905, CFI of 0.947 and TLI of 0.927. The model also fits the parsimonious fit with PCMIN/Df less than 5. All the parameters respect the suggested cut-off values. Hence, the CFA proves that this model is accepted.

3. Results and discussions

3.1. Socioeconomic characteristics of respondents

Table 3 summarizes the main socioeconomic characteristics of the respondents: 45% of our respondents are male, 55% are female. 50% are aged between 18 and 24, and 50% are aged between 24 and 30. 46% are students, 35% have a

Table 5 - Socioeconomic characteristics of respondents (N=246).

Variable	Categories	Frequency
Gender	Male	106
	Female	128
Age	Between 18 and 24	117
	Between 24 and 30	117
Work	Full-time work	19
	Part-time work	82
	Unemployed	27
	Student	106
Education level	High School	45
	Diploma	40
	Bachelor	115
	Master/Doctorate	34
Nationality	Greek	234
Tourists	Local	227
	Domestic tourist	7
	International tourist	0

part time job, 11% are unemployed and 8% are working full time. 49% have a university degree, 19% have a high school degree, 17% have a diploma and 15% have a master/doctorate degree. They are 100% local Greeks.

3.2. Hypothesis testing and discussions

Figure 2 above presents the shape of the diagram after the modifications (two new paths).

Figure 2 - Confirmatory factor analysis model of the impact of consumers' attitudes, subjective norms, PBC on the intention to shift to Mediterranean diet to prevent climate change.

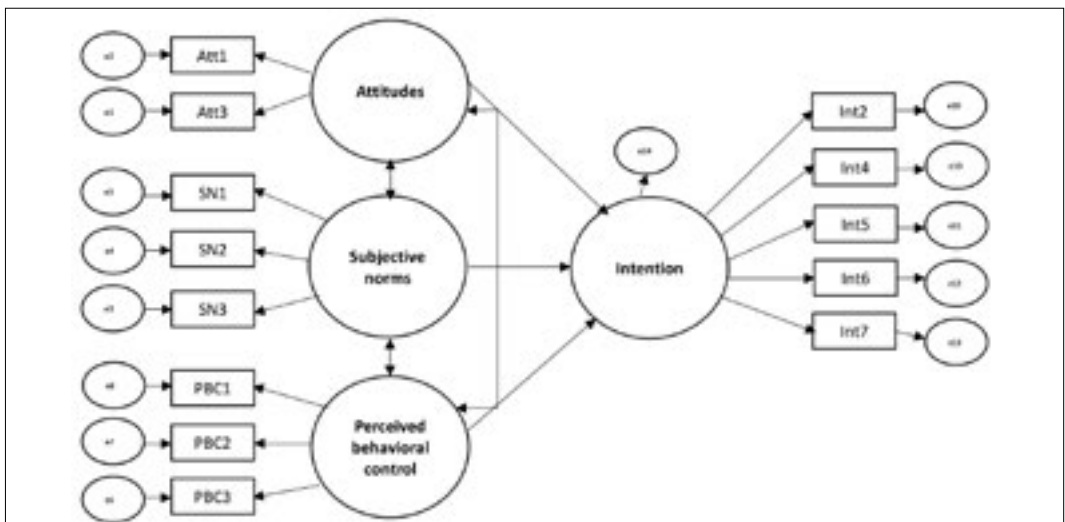


Table 6 - Regression weights of attitudes, PBC and subjective norms on intentions.

<i>Parameter</i>	<i>Estimate</i>	<i>Standard error</i>	<i>C.R</i>	<i>P-value</i>
Attitudes	0.413	0.123	3.369	0.000
PBC	0.526	0.204	2.584	0.010
Subjective norms	-0.102	0.063	-1.636	0.102

The figure was elaborated based on AMOS.26 Model for our study. Please note that ovals represent the latent variables, whilst measured variables are indicated in rectangles. The path coefficients of each arrow can be interpreted as common regression weights.

As for the regression weights, for the three main parameters (attitudes, subjective norms and perceived behavioral control) on the intention, the results are as follows.

Based on the CFA¹ results, H1 that states that consumers' attitudes have a significant impact on their intention to shift towards the Mediterranean Diet to prevent climate change is confirmed based on the path coefficients. The latent construct of attitudes is positively related to intention (0.413, CR²=3.369, P-value=significant). This result suggests that young Greek consumers who have a strong attitude towards shifting to the Mediterranean Diet for climate issues are more likely to have a greater intention compared to consumers with a weak attitude, which implies that the young Greek consumers who evaluate the shift towards the Mediterranean Diet to prevent climate change as a positive action will likely have a greater intention than those who evaluate it as a negative action. Many factors can influence attitude, such as personal values in food shopping, perceived barriers, and confidence in information (Annunziata and Scarpato, 2014). Our results are in accordance with previous findings that highlight the influence of attitudes on sustainable food behaviors (Chen, 2011; Masud *et al.*, 2016). However, despite the positive attitudes shown by the consumers to products characterized by sustainability attributes, there are still several factors that limit the transformation of attitudes in the real acts of purchase.

We reject H2 which states that subjective norms

have significant impact on young Greek consumers' intention to shift towards the Mediterranean Diet to prevent climate change. The latent construct of subjective norms is negatively related to intention (-0.1). Therefore, subjective norm is a non-significant predictor of shifting intention to prevent climate change. Subjective norms had already been identified as the weakest link in intention models by earlier researches, who have used TPB frameworks in general (Ajzen, 1991). Young Greek consumers feel that the support and approval of "referents" is not an important factor that would impact their behavior of shifting their diets towards the Mediterranean Diet to prevent climate change. Their friends/family members/peer group opinions and support are not influential. Our results align with Paul *et al.*, 2016, and misalign with Masud *et al.*, 2016 and Eker *et al.*, 2019 who suggest that value-driven actions motivated by group dynamics rather than health and climate risk perceptions are more efficient.

The results show that H3 which states that "PBC has the most important significant impact on young consumers' intention to shift towards the Mediterranean Diet to prevent climate change" is supported. PBC positively affects the intention level, which means that the intention is highly influenced by consumers' beliefs about the presence of factors that may facilitate or impede the behavior of shifting their diet. The coefficient magnitude shows that the effect of PBC on the intention to shift towards the Mediterranean Diet is stronger than that exerted by attitude (0.526, CR = 2.584, p-value=significant). Our result aligns with Paul *et al.*, 2016 and Masud *et al.*, 2016.

Based on these findings, it can be concluded that PBC and attitudes have a great impact on young Greek consumers' behavioral intention, which

¹ Confirmatory Factor Analysis.

² CR: Critical ratio, which divides the regression weight estimate by the estimate that its standard error gives.

might lead to shifting their diet towards the Mediterranean Diet for climate issues. However, there is an urgent need for a better awareness of the role of social adaptation, such as involvement with organizations and associations, as well as information dissemination. This could allow consumers to gain more insights and ensure improvements in order to have a socially acceptable and effective adaptation behavior for climate change (Weingart *et al.*, 2000). Mass media can contribute significantly towards greater public understanding and awareness of climate change issues using “opinion leaders” like celebrities, sports stars etc. in a sequential manner to stimulate intentions for diet shifts. It would be desirable to revise the short-term effects of media campaigns. Climate change is considered a complex issue. Hence, public authorities, policy makers and communicators need to increase public awareness of the environmental footprints of food, encourage appropriate behaviors towards adaptation to climate change, and respond to the information needs of the environmentally conscious consumers.

4. Conclusions

This research aimed to identify the factors that influence young consumers’ intention to shift towards the Mediterranean Diet to prevent climate change. Using the Theory of Planned Behavior, a quantitative and qualitative analysis has been conducted on the basis a survey conducted in Chania, Greece. It can be concluded that consumers’ Perceived Behavioral Control (PBC) and attitudes are important factors that impact young consumers’ intention to shift their dietary plan towards a Mediterranean-style one for climate change reasons. The results indicate that by portraying shifting diets as a positive action, young consumers will likely have a greater intention to perform it, than those who evaluate it as a negative action. Furthermore, beliefs about the presence of factors that may facilitate the behavior of shifting their diets will increase young consumers’ intention to perform such a behavior. However, social norms, which implies the approval and support of ‘important people’ is not very influential in this case.

These findings are important to consider when

designing and targeting campaigns that promote the Mediterranean Diet as a sustainable diet, which contributes to preventing climate change. Public authorities, policy makers and communicators should increase consumers’ awareness about the presence of such diets, which can benefit their overall health, as well as the environment. Results from our case study provide useful suggestions for policy actions to promote traditional Mediterranean dietary habits, especially among young consumers as it is deemed crucial to intervene in the formation and routinization of mainstream unsustainable consumption practices and patterns. Hence, the Mediterranean Diet can be adopted by school canteens to encourage kids and young population to familiarize themselves with the components of the Mediterranean Diet, and help them create a healthy lifestyle (Cardillo, 2017). Furthermore, there is an important need for information regarding food products by environmentally conscious consumers, which can be satisfied by food labelling that highlights the main content and nutritional quality of the product. Furthermore, local production which is the essence of the Mediterranean Diet, can be more encouraged as it shortens the time between harvest and consumption which results in higher contents and quality of micronutrients, and also has very low environmental impact.

There are some limitations of this study that need to be taken into account. First, the study has been conducted in Crete, Greece, an area that is globally known for the Mediterranean Diet. The young consumers were already familiar with the concept, and most of them knew what this diet advocates. However, in other areas, it might be different, since the young consumers’ awareness regarding the Mediterranean Diet will be much lower. Therefore, the generalizability of our findings might be difficult, especially in non-Mediterranean Diet areas that have been following completely different diets for a lifetime. Furthermore, the study is limited to measuring the shifting intention towards the Mediterranean Diet to prevent climate change, there is no measurement of actual shifting behavior. Although previous findings have supported that intention to act is positively correlated with actual behavior, there is a need to incorporate actual shifting behavior along with the intention in future studies.

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