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Eating away from home: A quantitative analysis of food neophobia (FNS) and satisfaction with food life (SWFLS) scales among university students

M. Arcadu [a,b,*], R. Cataldo [c], L. Migliorini [a]

[a] University of Genova, Department of Educational Science (DISFOR), Italy
[b] Pontifical Catholic University of Valparaíso (PUCV), Chile
[c] University of Naples Federico II, Department of Social Sciences, Italy

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ABSTRACT

In the context of increasing globalization of the food industry, young adults are exposed to a variety of foods and culinary traditions that challenge their established and traditional food preferences. The process of food choice is particularly evident in the context of living away from home, where independent management of one's diet is required and where reactions to new foods can vary widely, from acceptance to rejection. Furthermore, these dynamics have the potential to affect well-being and satisfaction, which are critical elements of quality of life during this transition to autonomy. This study examines the relationship between food neophobia and food-related satisfaction in a sample of 227 Italian university students living away from their families of origin, trying to determine the food consumption preferences of students by categorizing them by performing a clustering analysis and using a multiple correspondence analysis.

An online questionnaire was used to collect data on sociodemographic variables, levels of food neophobia, and food-related life satisfaction. The analysis identified two consumer profiles: the first characterized by reluctance to try new foods and low food satisfaction; the second by openness to new foods and higher food satisfaction. The results demonstrate the impact of sociodemographic characteristics, including gender, age, income and field of study, on the relationship between food neophobia and food well-being. The study suggests that interventions aimed at reducing food neophobia could improve food-related quality of life in this population. In addition, cultural integration and food autonomy appear to be key factors in promoting student well-being.

1. Introduction

In the current socio-economic context, eating habits and the relationship between individuals and food play a key role in determining health and well-being. The concept of food modernity, encompassing a range of social, cultural, economic and technological transformations, continues to exert a significant influence on how individuals engage with food in various ways, including production, consumption and conceptualisation (Arcadu & Migliorini, 2024; Bush et al., 2013; Inglis, 2009; Mintz & Du Bois, 2002; Nutzenadel & Trentmann, 2008; Oosterveer & Sonnenfeld, 2012; Stazio, 2021). Furthermore, this phenomenon can be attributed to the increasing daily availability of food from around the world (Wansink et al., 2003). The import and export of products on a large scale has led to significant changes in food preferences and tastes, which may also vary according to social, gender or age factors (Stazio, 2021). In the context of the young population, these changes assume particular salience. Indeed, young people are often exposed to new environments and eating habits, especially during transitional phases, such as leaving the family home. Living independently away from the family unit places them in a unique position to examine the psychological and sociocultural factors that influence their relationship with food (Nelson et al., 2009; Sogari et al., 2018). A particularly intriguing case study is that of university students, who, by definition, are required to transition from family living to independent living, necessitating a major adjustment to their dietary habits. The transition to independent living often necessitates the management of one's own diet, frequently with limited knowledge of nutrition and constrained by economic and temporal limitations stemming from academic obligations (Falciglia et al., 2000; Galloway et al., 2003; Schnettler, Crisóstomo, et al., 2013; Schnettler, Grunert, et al., 2017; Poobalan et al., 2014). Moreover, the process of acclimatising to a novel environment has been demonstrated to influence dietary choices,

* Corresponding author at: University of Genova, Department of Educational Science (DISFOR), Italy.
E-mail address: martina.arcadu@edu.unige.it (M. Arcadu).

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resulting in alterations to the diet that, in certain instances, can have ramifications on health (Rigal et al., 2006). However, in contrast to other groups of young adults who do not live away from home, university students who live away from home experience a unique living environment in which distance from the family is associated with exposure to new food environments and new autonomy in food choice (Schnettler, Höger, et al., 2017; Vidigal et al., 2015; Benton, 2004). In this study, we focus on two key psychological constructs: food neophobia (FN) and food-related life satisfaction (SWFL), which play a crucial role in shaping individuals' food choices and well-being. Food Neophobia, defined as the reluctance to try new foods, varies widely among individuals (Pliner & Hobden, 1992). While some individuals enjoy trying new foods, others show marked difficulty (Ritchey et al., 2003). This phenomenon can be influenced by a series of factors, including aversion, perception of danger and disgust (Rozin et al., 1993; Rozin & Fallon, 1980; Diener et al., 1999). Although often conceptualized as a personality trait, FN has also been considered a behavioral phenomenon, characterized by the avoidance of unfamiliar foods. The Food Neophobia Scale (FNS), developed by Pliner and Hobden (1992), is a widely used tool to produce a standardized measure of FN, despite some variations in its applications (Meiselman et al., 2010; Ritchey et al., 2003). FN has been studied in relation to contemporary issues, including the acceptance of new foods and emerging food technologies (Backstrom et al., 2004; Grunert et al., 2003). The existing literature indicates that age is a determining factor of FN, with young adults showing greater openness to the consumption of unfamiliar and new foods (Nørgaard et al., 2014; Vermeir & Verbeke, 2006). Research suggests that, even among young people, FN can be influenced by socio-demographic variables such as gender, family income and level of education, which can moderate the degree of acceptance of new foods (Schnettler, Grunert, et al., 2017; Vidigal et al., 2015). Despite the large number of studies on its impact on food acceptance (Barrena & Sánchez, 2013; Camarena et al., 2011; Chung et al., 2012; D'Antuono & Bignami, 2012; Hersleth et al., 2011; Hoek, Choe, & Cho, 2011; Hoek, Luning, et al., 2011; Jaeger et al., 2011; King et al., 2008; Olabi et al., 2009; Ritchey et al., 2003; Sanjuán-López et al., 2011; Tuorila et al., 2001), there is little research exploring FN among young adults. Although FN tends to stabilize in adulthood, the context in which young adults find themselves living can influence their level of openness or resistance to new foods (Schnettler, Höger, et al., 2017; Vidigal et al., 2015). Specifically, the university environment and the experience of living away from home could be facilitating factors in exposure to new cuisines and eating practices, with a potential impact on the propensity to experiment with food. However, the extant literature on this subject is limited, and there is a paucity of transnational studies that would allow us to identify the variables that influence daily food choices and the willingness to try new foods in this specific population group (Falciglia et al., 2000; Galloway et al., 2003). Similarly, SWFL has been studied as a component of subjective well-being, with studies showing its positive correlation with overall life satisfaction (Grunert et al., 2007; Schnettler et al., 2012; Schnettler, Miranda, et al., 2013; Andersen & Hyldig, 2015; Ares et al., 2015; 2016). However, the precise mechanisms through which nutrition influences subjective well-being remain unclear. Grunert et al. (2007) developed and tested the Satisfaction with Food-related Life scale (SWFLS) in three studies conducted in eight European countries, verifying its reliability through the internal consistency coefficient, known as Cronbach's alpha, which in this case showed values between 0.81 and 0.85. Schnettler et al. (2012) found a positive correlation between individuals' SWFL and their overall satisfaction with life. Numerous studies have also observed that FN is inversely correlated to SWFL, suggesting that higher levels of FN may be associated with lower SWFL (Arvola et al., 1999; Nordin et al., 2004; Schnettler, Crisóstomo, et al., 2013; Schnettler, Grunert, et al., 2017). SWFL in young people has been positively associated with healthier eating behaviors and a greater openness to balanced and diversified diets (Grunert et al., 2007; Schnettler et al., 2012). In recent years, research interest in FN among young adults has expanded beyond its impact on eating behaviour to include an analysis of well-being, particularly as it relates to food (Grunert et al., 2007; Schnettler, Denegri, et al., 2015; Schnettler, Miranda, et al., 2015). For example, Ares et al. (2014) have shown that food-related well-being is closely linked to different aspects of life, including physical health, physical functioning, cognitive abilities, positive emotions, social interactions and interpersonal relationships. Furthermore, a study conducted by Schnettler et al. (2014) classified different profiles based on their FN, life satisfaction and SWFL. The results suggest an inverse and statistically significant relationship between FN and these two indicators of well-being. One interpretation of this relationship can be attributed to the impact of emotions aroused by food: when the eating experience is associated with negative emotions, overall subjective well-being and food-related well-being tend to decrease (Raudenbush & Frank, 1999). Food choices have also been influenced by a variety of factors, including family context, imitation of parents and peers. The influence of the family on eating habits may continue over time and influence eating habits during the transition to adulthood. In particular, a study of German university students found that those living with their families had a more balanced diet than those living independently, and that family eating practices influenced the food choices and, more generally, the food-related well-being of university students (Sharma et al., 2009). Despite these findings, research examining the relationship between SWFL and FN is still limited: existing research has largely examined them as separate constructs, often focusing on their relationship with general demographic factors or cultural influences. It is therefore important to investigate the relationship between food neophobia and food-related life satisfaction in university students living away from home, as this group is at a crucial stage in the transition to food autonomy. Living away from home implies the need to make independent decisions about food and to deal with new food availability and culinary traditions. High levels of food neophobia may limit access to a varied and balanced diet, affecting not only dietary quality but also psychological and social well-being. It is therefore essential to understand the role of neophobia in this specific population in order to identify the implications for their dietary adaptation and the establishment of habits that could be maintained in the long term. This study provides an exploratory analysis of a group of Italian university students living away from home. We aim to distinguish different profiles of university students based on their food-related life satisfaction and food neophobia by analyzing their socio-demographic characteristics. Based on previous studies (Grunert et al., 2007; Schnettler et al., 2012), we expect to confirm the hypothesis that there is an inverse relationship between food neophobia and food-related life satisfaction, as well as to identify specific types of university students characterized by different levels of food neophobia and SWFL in relation to their sociodemographic characteristics. We aim in particular to explore three main aspects: (1) the relationships between the SWFL and FNS scales; (2) the distinction of young consumers' profiles based on their levels of food satisfaction and food neophobia; and (3) the characterization of these profiles in relation to socio-demographic characteristics, and their willingness to be open to new food.

2. Material and methods

2.1. Sample and procedure

The survey was conducted via an online questionnaire between September and November 2023. Non-probability sampling was employed to recruit 227 university students from Italy who met the specific criterion of having resided in a city other than their city of family origin. This sampling method was chosen due to the difficulty of accessing a complete list of all eligible students across multiple cities and the need to reach participants fitting the specific criteria efficiently. Prior to answering, participants were required to provide informed consent through an explicit declaration presented at the beginning of the

online questionnaire. This informed consent form outlined key aspects of the study, including its purpose, the anonymity of the data collected, and the exclusive use of the data for scientific and statistical purposes. It also informed participants of their right to withdraw from the study at any time without providing a reason or facing any consequences. Participants were required to indicate their agreement by selecting "I agree to participate in this survey" before proceeding with the questionnaire. Without this explicit consent, it was not possible to access or complete the survey. The data were collected in a fully de-identified manner and reported only in aggregate form, ensuring that individual responses could not be traced back to the participants. This procedure ensured compliance with ethical research standards and guaranteed the protection of participants' rights and privacy.

2.2. Instruments

In the present study, the initial section of the questionnaire included inquiries pertaining to the participants' sociodemographic characteristics. The variables collected included gender, age, the city of geographic origin, the city of current residence as an off-campus student, the course of study attended, the disciplinary area of study, family income, and whether or not they were concurrently employed while pursuing their studies, with a specification on the type of employment (full-time, part-time, or on-call).

The second part of the questionnaire included two scales:

- The SWFL (Grunert et al., 2007) is a 5-item scale grouped into a single factor. The respondents indicated their degree of agreement with the statements using a 7-level Likert scale, with 1 indicating strong disagreement and 7 indicating strong agreement.

- The FNS was adapted to the Italian context (Guidetti et al., 2018) with six items grouped into a single dimension. Participants indicated their degree of agreement on a 5-point Likert scale, with 1 indicating that the statement was not at all descriptive of the participant and 5 indicating that the statement was very descriptive of the participant.

The Italian version of the Satisfaction with Food-related Life (SWFL) scale showed sufficient levels of internal reliability, with Cronbach's alphas between 0.81 and 0.85, thus confirming its high internal consistency and applicability in the Italian context (Grunert et al., 2007). In the present study, the SWFL scale demonstrated good internal consistency, with a Cronbach's alpha of 0.861. The Food Neophobia Scale (FNS), in its Italian revision, showed good construct validity (Guidetti et al., 2018). This maintained internal consistency even after the elimination of 4 items, being balanced and unchanged with respect to gender, age groups, education levels and administration methods (paper-and-pencil and online) (ibid.). In the present study, Cronbach's alpha value was 0.716.

In order to classify consumer segments into neophobic or neophilic (non-neophobic), the modes of responses to the neophobia scale were used.

2.3. Statistical analysis

To address the objectives of the study, we adopted a two-level analytic strategy. First, we analyzed the aggregated scores of the FNS and SWFL scales to verify their psychometric structure and explore the relationship between the two constructs. Second, we conducted an item-level analysis using Multiple Correspondence Analysis (MCA) and Cluster Analysis in order to identify meaningful response profiles and examine their associations with sociodemographic variables. This dual-level approach allowed us to combine psychometric rigor with exploratory insight into young adults' food-related behaviors. This study used the methods used by Kaman and Yazicioğlu (2024), Schnettler, Grunert, et al. (2017), and Schnettler, Crisóstomo, et al. (2013) to investigate the relationship between the FNS and SWFL scales and to determine the profiles of students based on their levels of food satisfaction and food neophobia.

In detail, to analyse the relationship between the two scales, and thus to explore the first aspect of the work, a confirmatory factor analysis (CFA) with correlated latent constructs was conducted. Parameters were estimated using robust maximum likelihood (Hair et al., 2004; Gherghi & Lauro, 2008). The KMO coefficient and Barlett's test of sphericity were used to measure each scale's validity. The KMO coefficient tests whether the sample size is enough for factor analysis. (Namlu, 2004) and the minimum KMO value is proposed as 0.60 (Günbatar, 2014). Values of the KMO statistic lower than 0.60 indicate that the analysis may not be appropriate. The fact that the eigenvalue and the explained variance ratio are high indicates that the conceptually designed structure is a statistically appropriate choice. Bartlett test of sphericity (Mendes, 2003), on the other hand, is used to evaluate whether applying the correlation matrix for factor analysis would be convenient (Mavili et al., 2014). It tests the null hypothesis that the correlation matrix may be an identity matrix, that is, that the variables may be uncorrelated in reality. Regarding construct validity, convergent validity was assessed by examining the significance of the t-values of the factor loadings for each factor, along with the composite reliability (values >0.7) and the average variance extracted (AVE, values >0.5) (Hair et al., 2004). Discriminant validity was evaluated by comparing the AVE for each factor with the squared correlation between the scales (Hair et al., 2004). To assess the model's goodness of fit, several indices were used: the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA). A model is considered to fit well if these indices are greater than 0.90, and if the RMSEA is less than 0.08 (Kline, 2023).

Then, to test and investigate the relationship between socio-demographic attributes and the food satisfaction and neophobia scales and to determine the food consumption profiles of students, and thus to explore the second and third aspects of this work, the multiple correspondence analysis (MCA) and the cluster analysis were performed.

Before applying the MCA, cross-tabulations and chi-square tests (significance level 5 %) were employed to determine the statistical significance of the associations between the food satisfaction scale, the degree of food neophobia, and socio-demographic factors (such as gender, age, income, origin, type of studies, type of work, and eating style).

The MCA is a statistical technique that became known with the research of Pierre Bourdieu (Hjellbrekke, 2018) and it is widely utilised in research on eating behaviors and people's relationships with food (Jarvinen et al., 2014; Kahma & Toikka, 2012; Kaman & Yazicioğlu, 2024; Prieur et al., 2008), or to establish the relationship between socio demographic factors and buying behaviour attributes (Raj & Mishra, 2020).

MCA is a type of exploratory factor analysis designed to reduce the dimensionality of large categorical data sets that include more than two variables distributed among a large number of individual responses. It is a statistical method used to analyse and uncover patterns in categorical data. It is particularly useful for identifying and visualising hidden structures within a dataset. It is favoured for its adaptability and efficiency in examining the patterns of association between numerous categorical dependent variables. The primary goals of MCA are as follows: (1) to provide a typology of the individuals, i.e., to examine the similarities among the individuals from a multidimensional perspective; (2) to evaluate the relationships between the variables and investigate the associations between the categories; and (3) to connect the variables and the individual studies in order to use the variables to characterise the individuals. In this study MCA has been applied to investigate the relationship between socio-demographic attributes and the food satisfaction and neophobia scales.

The cluster analysis was used to determine typologies of students

according to their satisfaction with food-related life and food neophobia, with linkage by Ward's method and the squared Euclidian distance as the measure of similarity between objects (Hair et al., 2004). The number of groups was obtained by the percentage change of the recomposed conglomeration coefficients.

All statistical analyses were carried out with R language software.

3. Results

3.1. Distribution of the research participants by demographic variables

Table 1 shows the sample description. Sociodemographic variables analyzed included gender, age, household income, geographic origin, employment status, disciplinary area of study and dietary style. The sample consisted of 227 individuals. Examination of the table shows that there is a prevalence of the female gender covering 79 % of the participants. With respect to age, 57 % of the participants fall in the 18–23 age group. For self-reported household income, the distribution shows that 35 % of households in the sample earn between 15,000 and 30,000 euros annually; 21 % have an income of less than 15,000 euros, while 17 % range between 30,000 and 40,000 euros. Households with incomes over 50,000 euros account for 17 % of the sample. In terms of geographic origin, most participants are from the North (43 %), followed by the Center (23 %), South (17 %) and Islands (17 %). In terms of employment status, 66 % of participants say they do not work at the same time as their studies, while 19 % work on call. 11 % work part-time and only 5 % work full-time. In the field of studies, the main subject areas covered by the sample are Humanities-Social (56 %), Science-technology (34 %), Medical (8 %) and Health (1 %). Finally, for dietary style, the majority of participants follow an omnivorous diet (63 %), followed by vegetarian (19 %), vegan (12 %), pescetarian (4 %) and other dietary styles (2 %).

3.2. Findings regarding the confirmatory factor analysis

Firstly, CFA of the scales, validity and reliability coefficients and findings related to KMO Bartlett tests are presented in the study. The CFA results indicated that the scales used in the analysis satisfied the composite reliability test (above 0.7) and AVE values (close to 0.5) (Table 2).

KMO coefficients for the two scales were more than 0.78. At the same time, Barlett's test of sphericity showed significance (p.value = 7.374024e-198).

The value of the squared correlation between FNS and SWFL (−0.293) was lower than the AVE of the scale factors, verifying the discriminant validity between the constructs (Hair et al., 2004). Discriminant validity between SWFL and FNS was also verified. The standardized factor loadings for all items were statistically significant in all scales; thus, there was convergent validity (Fig. 1).

Values correspond to standardized factor loadings.

Therefore, the measurement model presented adequate internal validity. The CFA model had a good fit of the data; indices exceeded the minimum values recommended in the literature (CFI = 0.943, TLI = 0.901, RMSEA = 0.065). The negative correlation (standardized covariance) value between SWFL and FNS is significant, although these values were low.

Table 1
Sociodemographic characteristics of the sample.

Variable	Categories	Frequency per category (N = 227)	Percentage frequency per category (%)
Gender	F	180	79
	M	47	21
Age	18–23	129	57
	24–28	85	37
	over 29	13	6
Household income (thousand)	0–15	37	16
	15–30	79	35
	30–40	47	21
	40–50	25	11
	oltre50	39	17
Region of origin	North	98	43
	Centre	53	23
	South	38	17
	Isole	38	17
Job type	Full time	12	5
	Part time	24	11
	On-call	42	18
	None	149	66
Disciplinary Area	Medicine	19	8
	Healthcare	3	1
	Scientific-technological	78	35
	Humanistic-social	127	56
Food style	Omnivore	144	63
	Vegetarian	43	19
	Vegan	27	12
	Pescetarian	8	4
	Other	5	2

3.3. Preliminary analysis of significant relationships between sociodemographic variables and psychometric scales

Before applying Multiple Correspondence Analysis (MCA), chi-square tests were conducted to examine the associations between the items of the scales used (FNS and SWFL) and the sociodemographic variables collected. The results, considered significant at an alpha = 0.05 level, revealed relevant relationships that enrich the interpretation of the data and contextualize the emerging profiles in the subsequent analysis. For greater clarity, Table 3 summarizes the significant relationships that emerged between the Food Neophobia Scale (FNS) and Satisfaction With Food-related Life Scale (SWFL) items and the sociodemographic variables. Only items of the SWFL scale with statistically significant differences ($p < 0.05$) were included in Table 3 and in the following discussion. Items that did not reach the significance threshold were excluded from the table and not further discussed, as they were not considered relevant for the scope of this analysis.

Concerning the Food Neophobia Scale (FNS), Item N1 ("I always taste new and different foods") was found to be significantly associated with both the type of job held (p-value = 0.018) and the course of study attended (p-value = 0.035). These results suggest that working conditions and educational background may influence openness to experimenting with novel foods. Item N2 ("I don't trust novel foods") showed significant associations with geographic origin (p-value = 0.046) and job type (p-value = 0.023), highlighting the role of cultural and socioeconomic differences in perceived trust towards novel foods. Item N3 ("Ethnic food seems strange") was found to be influenced by participants' eating style (p-value = 0.016), suggesting that personal eating habits may shape attitudes towards ethnic food. Item N4 ("During the holidays I would be willing to try new foods") revealed significant associations with both job type (p-value = 0.020) and course of study (p-value = 0.021), while Item N5 ("I am afraid of eating food I have never tried before") was significantly associated with eating style (p-value = 0.015). Finally, Item N6 ("I like to try new ethnic restaurants") showed significant relationships with the course of study attended (p-value = 0.047) and eating style (p-value = 0.045).

For the Satisfaction With Food-related Life Scale (SWFL), Item S1 ("My life in relation to food and meals is close to my ideal") was found to be significantly associated with family income (p-value = 0.016), course of study (p-value = 0.034) and eating style (p-value = 0.006), indicating that economic factors and personal food choices influence overall food-related satisfaction. Item S5 ("Food and meals are positive items") showed a strong association with course of study (p-value <0.0001), suggesting that educational background plays a crucial role in positive perceptions of food.

Table 2
Composite reliabilities, average variance extracted (AVE), squared correlations between the food neophobia scale (FNS) and satisfaction with food-related life scale (SWFL), CFI, TLI and RMSEA indices.

Scale	Composite reliability	AVE	FNS	SWFL	CFI	TLI	RMSEA
FNS	0.8618	0.51	–	−0.293	0.943	0.901	0.065
SWFL	0.8609	0.54	−0.293	–			

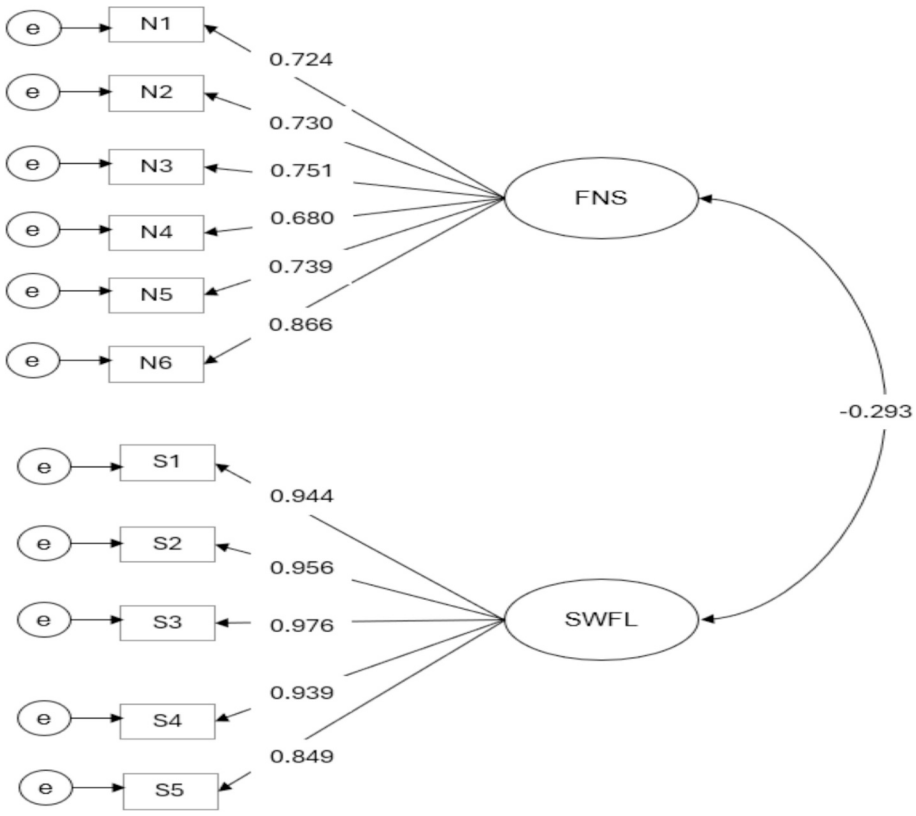

Fig. 1. CFA established best-fitting model of SWFL and FNS in a university student sample.

Table 3
Significant relationships that emerged between the food neophobia scale (FNS) and satisfaction with food-related life scale (SWFL) items and the sociodemographic variables.

Scale	Item	Sociodemographic Variables	p-value
FNS	N1 - I always try new and different foods	Job type	0.018
		Disciplinary Area	0.035
FNS	N2 - I don't trust new foods	Region of origin	0.046
		Job type	0.023
FNS	N3 - Ethnic food seems strange	Food style	0.016
FNS	N4 - During the festivals I would be willing to try new foods	Job type	0.020
		Disciplinary Area	0.021
FNS	N5 - I am afraid to eat food I have never tried before	Food style	0.015
FNS	N6 - I like to try new ethnic restaurants	Disciplinary Area	0,047
		Food style	0,045
SWFL	S1 - My life in relation to food and meals is close to my ideal	Household income	0.016
		Disciplinary Area	0.034
		Food style	0.006
SWFL	S5 - Food and meals are positive elements	Disciplinary Area	< 0.0001

These results underscore how key sociodemographic variables, including work, income, geographic origin, course of study, and eating style, significantly influence levels of food neophobia and food-related satisfaction. These relationships provide a significant context for interpreting the profiles that emerged through the MCA, highlighting the complexity of interactions between individual, social and cultural dimensions in the eating behaviors of young college students.

3.4. Findings of the multiple correspondence analysis

The MCA was used to explore the relationships between response modes with respect to openness to new foods, food-related life satisfaction, and demographic characteristics in a sample of young college adults living away from the family home.

The distributions of responses given to the NPS and SWFLS items are shown in Fig. 2. A legend of the response modes is shown in Table 4 and Table 5.

Also projected through square points in the graph are the sociodemographic characteristics identified as additional categories. The horizontal axis (F1) explains 18.35 % of the total variance and represents the level of food neophobia. The vertical axis (F2) explains 10.85 % of the total variance and represents the level of food-related life satisfaction. Altogether, these two axes explain 29.20 % of the variance in the data. The F1 axis of the analysis represents the degree of openness/closure to new foods, distinguishing between individuals who tend to be open to trying new foods (neophilic) and individuals who are closed and unwilling to try new food experiences (neophobic). The dots represent the categories of the variables under analysis. Point categories close together indicate greater similarity or association in the data while

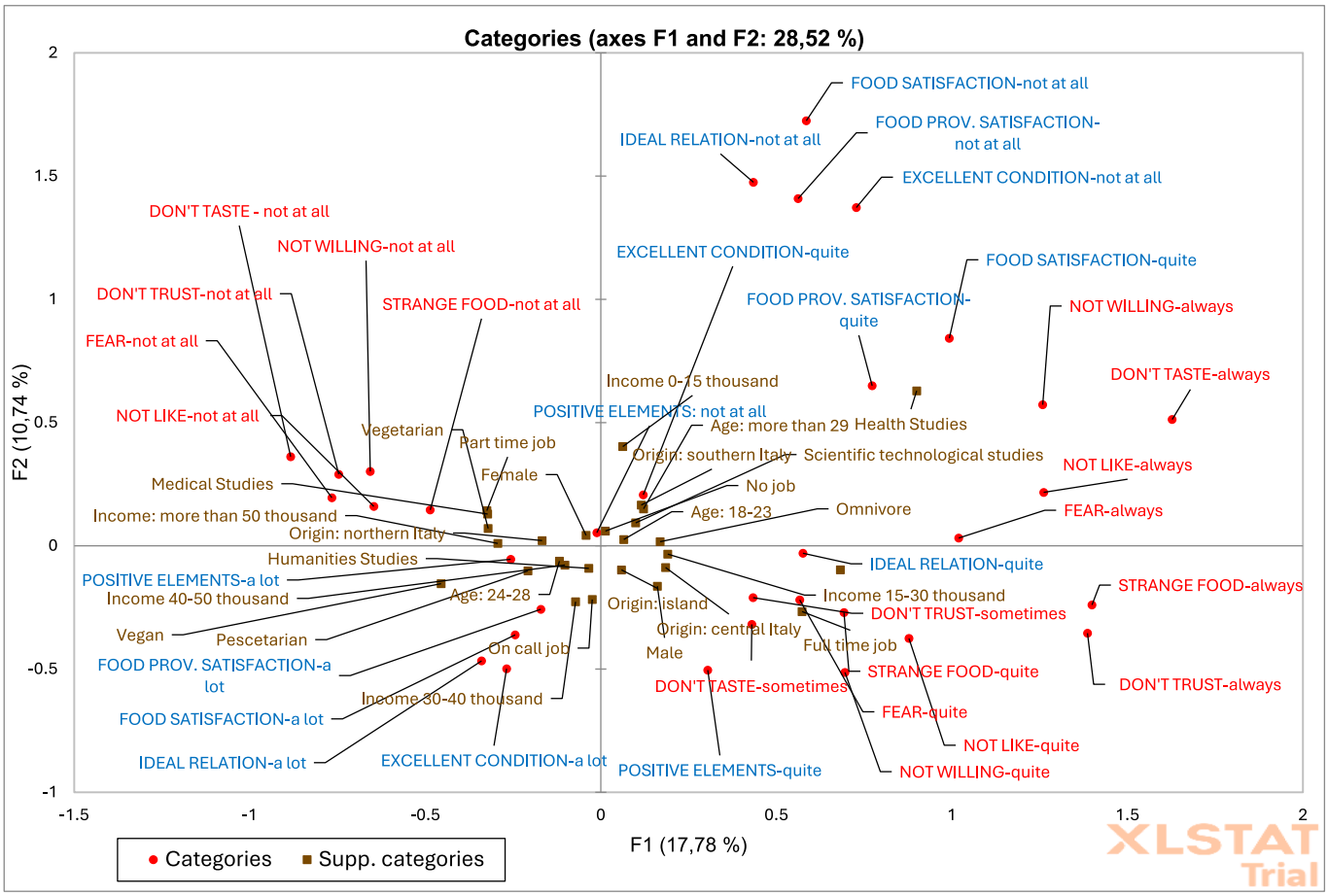

Fig. 2. Graph resulting from multiple correspondence analysis.

Table 4
Food neophobia scale items legend (red).

N1	I always try new and different foods R	DON'T TASTE
N2	I don't trust new foods	DON'T TRUST
N3	Ethnic food seems strange	STRANGE FOOD
N4	During the festivals I would be willing to try new foods R	NOT WILLING
N5	I am afraid to eat food I have never tried before	FEAR
N6	I like to try new ethnic restaurants R	NOT LIKE

Table 5
Satisfaction with food life scale items legend (blue).

S1	My life in relation to food and meals is close to my ideal	IDEAL RELATION
S2	In relation to food, the condition of my life is excellent	EXCELLENT CONDITION
S3	I am generally satisfied with my food	FOOD SATISFACTION
S4	Food and meals give me satisfaction in daily life	FOOD PROVIDES SATISFACTION
S5	Food and meals are positive elements	POSITIVE ELEMENTS

categories far apart indicate less similarity or association. Categories far from the origin along a specific axis are those that contribute most to the variance explained by that axis. Additional categories of sociodemographic variables do not contribute directly to the construction of the factorial axes but are projected into space to facilitate and enrich interpretation. Fig. 3 showed the arrangement of students according to the two factors considered. As can be seen, only a small percentage of the collective under analysis are on the right side of the graph, while the majority are on the left and middle sides.

3.5. Findings regarding the cluster analysis

Based on the ACM results, in the last stage of the research, a cluster analysis (hierarchical conglomerates) was used to determine typologies of young students according to their satisfaction with life, satisfaction with food-related life and food neophobia. Clustering is based on Euclidean distances between the responses of individuals regarding their food consumption preferences.

Cluster analysis enabled two typologies of students to be distinguished with significant differences in the average values of the FNS and SWFL scales.

The characteristic of these two clusters is presented in Table 6. In this direction, there are 84 students in the first cluster (37 %) and 143 students (63 %) in the second cluster.

The cluster analysis shows the presence of two main profiles of students.

A first profile that we could call "dissatisfied neophobes" is located on the right side of the F1 axis, it is characterized by a strong closure and reluctance to try new foods. The associated categories include the following modes of the NPS items:

- item N1 "non assaggio mai cibi nuovi e diversi-sempre" (I never taste new and different foods-always)
- item N2 "non mi fido dei cibi nuovi-sempre" (I don't trust new foods-always)
- item N3 "il cibo etnico sembra strano-sempre" (ethnic food seems strange-always)

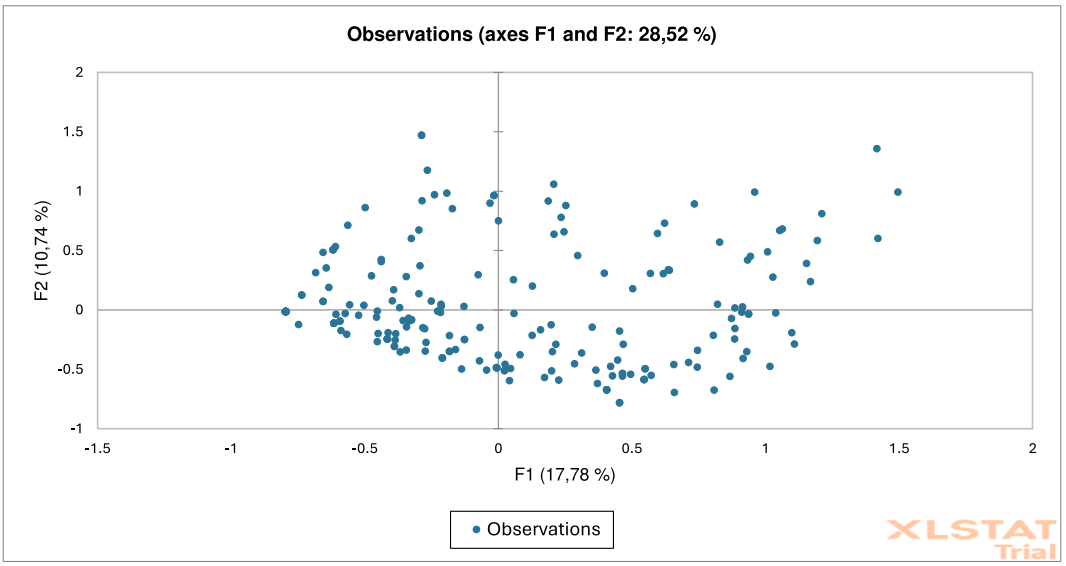

Fig. 3. Graph of observations resulting from multiple correspondence analysis.

Table 6
Averages of cluster profiles.

Scale	Item	Cluster 1 (n = 84)	Cluster 2 (n = 143)
FNS	N1 - I always try new and different foods (R)	2.30	1.38
FNS	N2 - I don't trust new foods	2.78	1.39
FNS	N3 - Ethnic food seems strange	2.59	1.66
FNS	N4 - During the festivals I would be willing to try new foods (R)	2.15	1.00
FNS	N5 - I am afraid to eat food I have never tried before	2.50	1.00
FNS	N6 - I like to try new ethnic restaurants (R)	2.13	1.18
SWFL	S1 - My life in relation to food and meals is close to my ideal	3.84	4.86
SWFL	S2 - In relation to food, the condition of my life is excellent	4.55	5.69
SWFL	S3 - I am generally satisfied with my food	5.08	5.58
SWFL	S4 - Food and meals give me satisfaction in daily life	4.85	5.67
SWFL	S5 - Food and meals are positive elements	4.17	6.12

Unsatisfied neophobes (Cluster 1).

- item N4 "durante le feste non sono disposto a provare nuovi cibi-sempre" (during festivals, I am not willing to try new foods-always)
- item N5 "ho paura di mangiare cibo mai provato prima -sempre" (I'm afraid to eat food I've never tried before-always)
- item N6 "non mi piace provare nuovi ristoranti etnici-sempre" (I don't like trying new ethnic restaurants-always).

These individuals also express very low food-related life satisfaction, as indicated by the modes of the SWFLS items:

- item S1 "la mia vita in relazione al cibo e ai pasti è vicina al mio ideale-per niente" (my life in relation to food and meals is close to my ideal-not at all)
- item S2 "per quanto riguarda il cibo, le condizioni della mia vita sono eccellenti-per niente" (As for food, the conditions of my life are excellent-not at all)
- item S3 "sono generalmente soddisfatto del mio cibo-per niente" (I am generally satisfied with my food-not at all)
- item S4 "cibo e pasti mi danno soddisfazione nella vita quotidiana-per niente" (food and meals give me satisfaction in daily life-not at all)
- item S5 "cibo e pasti sono elementi positivi-per niente" (food and meals are positive elements-not at all).

Looking at the socio-demographic characteristics of this group, it could be said that food neophobes tend to be male, aged 18–23 or over 29, come from central, southern or islands, have a low self-reported household income (0–15 thousand), work full time, study in science-technology subject areas and adopt an omnivorous eating style.

Satisfied neophilics (Cluster 2).

In contrast, a second profile of students could be called "satisfied neophile". This group is characterized by an openness to try new foods with higher scores on the NPS neophilic items. The categories associated with this group are located on the left side of the graph along the F1 axis and are represented by the following NPS-related items:

- item N1 "non assaggio mai cibi nuovi e diversi-per niente" (I never taste new and different foods-not at all)
- item N2 "non mi fido dei cibi nuovi-per niente" (I don't trust new foods-not at all)
- item N3 "il cibo etnico sembra strano-per niente" (ethnic food seems strange-not at all)
- item N4 "durante le feste non sono disposto a provare nuovi cibi-per niente" (during the festivals I am not willing to try new foods-not at all)
- item N5 "ho paura di mangiare cibo mai provato prima -per niente" (I'm afraid to eat food I've never tried before-not at all)
- item N6 "non mi piace provare nuovi ristoranti etnici-per niente" (I don't like trying new ethnic restaurants-not at all).

These individuals express, in contrast to the previous group, very high food-related life satisfaction, as indicated by the response patterns to the SWFLS items:

- item S1 "la mia vita in relazione al cibo e ai pasti è vicina al mio ideale -molto" (my life in relation to food and meals is close to my ideal-a lot)
- item S2 "per quanto riguarda il cibo, le condizioni della mia vita sono eccellenti-molto" (As for food, the conditions of my life are excellent-a lot)

item S3 "sono generalmente soddisfatto del mio cibo-molto" (I am generally satisfied with my food-a lot)

- item S4 “cibo e pasti mi danno soddisfazione nella vita quotidiana-molto” (food and meals give me satisfaction in daily life-a lot)
- item S5 “cibo e pasti sono elementi positivi-molto” (food and meals are positive elements-a lot).

The supplementary categories near these responses suggest some demographic and lifestyle characteristics associated with these participants: they tend to be female, aged between 24 and 28, come from northern Italy, work on-call or part time, adopt a vegetarian, pescetarian or vegan eating style, report a high average household income (30 K and above), and study in Humanities Social or Medical subject areas.

4. Discussion

The present study examined the relationship between levels of food neophobia and levels of food-related life satisfaction in a group of out-of-town university students. To the best of our knowledge, no previous studies have examined the relationship between food neophobia and food-related life satisfaction among university students living away from home. While the extant literature has extensively explored food neophobia and food well-being in different populations (Flight et al., 2003; Schnettler, Höger, et al., 2017; Tuorila et al., 2001; Henriques et al., 2009), no research has yet investigated these variables in relation to the specific food autonomy experiences of off-campus students. The transition to university life and living away from family represent pivotal moments for the development of autonomous eating habits (Nelson et al., 2009; Sogari et al., 2018). However, extant studies have primarily focused on changes in eating practices, neglecting to analyse the role of food neophobia and food-related life satisfaction in this context. The present study aims to address this research gap by conducting an innovative analysis of the eating profiles of off-campus students. The objective of the study was to examine and describe the behavioral profiles of students who are away from home and experiencing changes in their eating habits. An online questionnaire was used to collect data on sociodemographic variables, levels of food neophobia and food-related satisfaction, with the aim of clarifying how these dimensions manifest themselves in specific profiles. As this was the inaugural exploratory survey of this phenomenon, an online survey was conducted on a non-probabilistic sample, thus facilitating access to a specific population in line with the objectives of the study.

In the present study, the confirmatory factor analysis (CFA) was conducted to examine the relationship between the FNS and the SWFL scales. This initial analysis confirmed the reliability and discriminant validity of the two scales, justifying the use of total scores. However, to go beyond global indicators and capture more nuanced behavioral patterns, we also employed an item-level analysis. By exploring response modes through MCA and Cluster Analysis, we were able to identify two distinct student profiles that reflect differentiated experiences in food neophobia and satisfaction—insights that would have remained obscured in an analysis limited to scale totals.

The results of the present study show a negative relationship between the two scales considered. Although the correlation values were low, the FNS scores were inversely and significantly correlated with the SWLS scores. The low correlation between the scales is reflected in the two typologies found.

The initial cohort of students characterized as “dissatisfied neophobes” is typified by elevated levels of food neophobia and diminished food-related life satisfaction. Students exhibiting this profile are predominantly male, with an age range of 18 to 23 or over 29, and hailing from central or southern Italy or the islands. A significant proportion of these students come from low-income households, with an annual income ranging from 0 to 15 thousand euros. The majority of these students are engaged in full-time employment, have specialised in science or technology, and adhere to an omnivorous diet. The present study reveals an association between low family income and diminished levels of SWFL (satisfaction with food-related life). The data suggests that financial constraints may play a critical role in shaping these students’ experiences and satisfaction with food, as limited resources could restrict their access to a diverse and enjoyable range of food options. The second group of students, termed “satisfied neophiles”, exhibit low levels of food neophobia and high levels of food-related life satisfaction. These students are predominantly female, aged between 24 and 28, from Northern Italy, with a medium-high family income (over 30 thousand euros per year). They are more likely to work on-call or part-time, to study humanities/social sciences or medicine, and to follow a vegetarian, pescetarian or vegan diet. They are more open to trying new foods and report a greater sense of satisfaction in their eating experiences. The results provide information that is in line with existing literature and suggest directions for future research regarding the two profiles identified. Furthermore, the item-level analysis revealed meaningful differences that would have remained obscured when using aggregate scores alone. For example, within Cluster 1, item N2 (“I don’t trust new foods”) obtained the highest score (2.78), indicating a generalized distrust. However, other items within the same cluster, such as N4 (“During parties I would be willing to try new foods”, 2.15) and N6 (“I like to try new ethnic restaurants”, 2.13), showed lower values, suggesting a possible selective willingness to experiment new foods in contexts associated with socializing. These findings illustrate how item-level analysis can enhance the interpretive depth of food-related behaviors and experiences. Students in the dissatisfied neophobic group seem to be less inclined to explore new foods, which could limit their culinary experiences and negatively affect their life satisfaction related to food (Schnettler, Grunert, et al., 2017; Schnettler et al., 2016). This reluctance can be attributed to a fear of new flavors, as well as practical limitations: research has shown that food neophobia is also associated with factors such as income and urbanization, which in turn have a negative impact on food variety (Siegrist et al., 2013). The present findings are consistent with those of earlier studies, which have demonstrated that food neophobia is influenced by sociodemographic variables, including income, educational level and residential environment (urban vs. rural). In particular, Flight et al. (2003) demonstrated that individuals with a higher socioeconomic status tend to have lower levels of food neophobia, thanks to greater exposure to different food cultures and greater access to a wider variety of foods. Conversely, studies conducted in developed countries (Camarena et al., 2011; Meiselman et al., 1998, Meiselman et al., 2010; Sanjuán-López et al., 2011) have corroborated the negative correlation between higher income levels and food neophobia. Conversely, students categorised as satisfied neophiles have been shown to exhibit increased receptivity and curiosity towards novel culinary experiences, thereby enhancing their food experiences and opportunities for food exchange, and concomitantly increasing their food-related life satisfaction (Basaran & Demirel Ozbek, 2023; Verneau et al., 2014). This increased receptivity may be associated with greater cultural exposure and a more favourable attitude towards change and exploration (Torri et al., 2020; Carrillo et al., 2013). Furthermore, the link between higher socioeconomic status and greater food-related life satisfaction is consistent with what is reported in the literature on quality of life. Oshio et al. (2011) and Agrawal et al. (2011) have shown that higher socioeconomic status is positively associated with subjective well-being and overall life satisfaction. Consequently, the hypothesis that greater access to a more varied and higher quality diet could increase food satisfaction among young people with higher incomes is substantiated. Consistent with previous research, our study corroborates the finding that food neophobia is more prevalent among males (Fidan et al., 2010; Predieri et al., 2020; Proserpio et al., 2018). This finding is corroborated by studies such as those by Tuorila et al. (2001), who observed higher levels of food neophobia among men compared to women in diverse cultural contexts.The profile encompassing vegetarian and vegan eating styles appears to exhibit reduced levels of neophobia compared to omnivores (Tian & Chen, 2021). However, contradictory results have been reported in other studies. For instance, Chitra et al. (2016) conducted a study on young women in

India, which found a lower tendency to fear the new among non-vegetarians than vegetarians. This suggests that the link between neophobia and dietary choices may also be influenced by cultural factors and specific dietary contexts. It has been hypothesised that students from central and southern Italy and the islands may exhibit a stronger attachment to local food traditions, which may consequently impede their ability to adapt to new eating habits (De Steur et al., 2016). Conversely, students from Northern Italy may have been exposed to a broader array of culinary traditions, which could foster a more receptive stance towards novel foods (Malota & Mucsi, 2023; Savelli et al., 2018). These geographical differences may reflect the role of food traditions and cultural transmission in food preferences. Schnettler, Grunert, et al. (2017) emphasized how, for example, the family diet can have a significant impact on food neophobia, with students raised in more varied food contexts tending to develop a greater openness to new foods. Lower income and full-time employment may also limit the resources and time available for exploring new food options (Rabadán & Bernabéu, 2021). The reduced prevalence of individuals with a high socioeconomic status within the dissatisfied neophobic profile corroborates the previously identified correlation between income and food neophobia. Research conducted by MacNicol et al. (2003) and Flight et al. (2003) has demonstrated that individuals with a lower socioeconomic status exhibit a greater propensity towards selective and neophobic attitudes towards food, likely attributable to diminished exposure to a diverse array of foods and constrained resources for experimentation with novel culinary offerings. The disparities between the two groups could also have substantial psychological and social ramifications. For dissatisfied neophiles, a diminished openness to novel foods could signify a method of preserving their cultural and personal identity while away from home (Berry & Boyer-Davis 2024; Cantarero et al., 2013). Conversely, for those who are satisfied with their neophilia, increased openness to new foods may be perceived as a form of autonomy and self-affirmation (Branković et al., 2023). The relationship between neophobia and cultural identity has been highlighted in several studies: Flight et al. (2003) suggested that the acceptance of new foods is not only a matter of individual preferences, but is strongly linked to cultural values and social identity. In this sense, exposure to different food cultures can facilitate the adoption of more neophilic attitudes, while a strong identification with family food traditions can reinforce neophobic behaviors.

Our research confirms previous literature regarding the importance of considering food neophobia as a significant factor that can influence food-related life satisfaction and, ultimately, the general well-being of university students by generating different consumer profiles (Schnettler, Höger, et al., 2017). Early adulthood is a critical developmental period that can have a lasting impact on eating behaviour (Lowry et al., 2000). If not adequately addressed, food neophobia can persist from childhood into adulthood, negatively affecting the variety and quality of the diet in the long term (Donadini et al., 2021). This underscores the necessity for the development of targeted intervention strategies, particularly within academic settings where students are exposed to novel dietary habits and may be more susceptible to modifying their preferences. Interventions aimed at reducing food neophobia, such as food education, gradual exposure to new foods or the creation of opportunities to socialize with different foods, have the potential to improve the quality of food-related life for these individuals (Arcadu, 2023; Chitra et al., 2016). It is crucial to understand the factors that influence food preferences if effective public health promotion strategies are to be implemented. This is especially important when considering that greater food neophobia is often associated with a more monotonous and less balanced diet (Edwards et al., 2010; Raudenbush & Frank, 1999; Tuorila et al., 2001). A substantial body of research has demonstrated that food neophobia can impede the consumption of essential nutrients and elevate the likelihood of adopting unhealthy eating behaviors, such as excessive food selectivity and diminished intake of fruit and vegetables (Flight et al., 2003). This is particularly salient in the context of the rising prevalence of obesity and metabolic diseases in both developed and developing countries, underscoring the imperative for the promotion of healthier eating habits from early adulthood onward. Furthermore, high levels of food-related life satisfaction have been shown to be associated with superior mental health outcomes among college students (Schnettler, Miranda, et al., 2015). Support for college students living away from home could include orientation programs designed to familiarize them with local food traditions and encourage greater openness to new foods. Such programs have the potential to improve not only their nutritional intake, but also their cultural integration and their general well-being (Nelson et al., 2009; Sogari et al., 2018). Interventions of this nature could be integrated into university support services, with the objective of promoting culinary sharing experiences through student canteens or extracurricular activities that encourage food exploration in a safe and familiar social context. Furthermore, targeted educational strategies could assist students in comprehending the benefits of a varied and nutritionally balanced diet, thereby reducing their level of food neophobia over time (Donadini et al., 2021). Furthermore, the university period is often associated with the formation of poor eating habits (Ramalho et al., 2012). This can potentially lead to an exacerbation of these habits, as food neophobia has been shown to have a negative impact on dietary variety (Tuorila et al., 2001). Early interventions targeting university students could therefore have long-term effects, promoting not only greater food openness but also an overall improvement in diet quality and psychological well-being.

In conclusion, this study explored the interaction between food neophobia, food-related life satisfaction and socio-demographic factors among off-campus university students, identifying distinct profiles of young consumers. The results offer useful insights for interventions aimed at promoting healthier eating habits and improving the well-being of young adults. In particular, educational and experiential strategies could reduce food neophobia, while recognizing the role of variables such as income and gender can facilitate personalized interventions.

5. Study limitations and future developments

It is important to recognize that our study is not without limitations. First, the use of a non-probabilistic sample limits the generalizability of the results. Second, it is possible that the online questionnaire introduced a selection bias, whereby students with a specific interest in food issues may have been more likely to participate. Furthermore, the sample is characterized by a higher percentage of women, which could have influenced the results, particularly in relation to variables such as food neophobia and food-related life satisfaction, as these may differ according to gender. Future studies should aim to obtain a more balanced representation of gender to provide a comprehensive understanding. In the future, longitudinal studies conducted with representative and unbiased samples of the target population could provide a deeper understanding of how levels of food neophobia and food satisfaction change over time, especially during the transition period to university. In addition, future research could identify specific dimensions of food neophobia that may be more or less sensitive to contextual factors. For example, analyzing whether shared social or cultural contexts such as communal meals, parties or family environments could reduce levels of neophobia, offering useful insights for both theoretical development and practical interventions. Further research could also employ an in-depth qualitative approach to investigate the relationship between the variables that were found to be descriptive of the two groups. In conclusion, the scope of the research could be broadened and compared with other groups of young university students residing in the same conditions in another country.

6. Conclusion

In conclusion, the present study examined the relationship between

levels of food neophobia and food-related life satisfaction in college students living away from the family home of origin through the use of Multiple Correspondence Analysis. Two distinct profiles were identified, which we designated as "dissatisfied neophobes" and "satisfied neophilics" respectively. Those who are dissatisfied with new foods tend to avoid them and report low levels of satisfaction with food. In contrast, those who are satisfied with new foods and dining experiences tend to be more open to new foods and report greater satisfaction with food. These findings indicate that interventions designed to reduce food neophobia and foster openness to new foods may enhance the quality of life and well-being of college students. Orientation and nutrition education programs during the college years could facilitate adaptation to new eating habits after transfer and promote positive cultural integration.

CRediT authorship contribution statement

M. Arcadu: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Data curation, Conceptualization. **R. Cataldo:** Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Formal analysis, Data curation, Conceptualization. **L. Migliorini:** Supervision.

Ethical statement

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and followed the ethical guidelines for research involving human participants. Participants were informed about the purpose of the study, and their participation was entirely voluntary. Written informed consent was obtained prior to their involvement. Data were collected anonymously and handled in compliance with privacy regulations, ensuring confidentiality and the protection of personal information.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. This research did not receive any grant from funding agencies.

Data availability

Data will be made available on request.

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