

Shaping food choices: the influence of nutritional literacy, motivation and eco-concern on young adults' decisions in university canteens

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Abstract

Purpose – This study investigates the determinants of university students' perceived value of canteen services in Emilia-Romagna, a highly dense university area located in Northern Italy, to explore how this is shaped by individual and contextual factors.

Design/methodology/approach – A PLS-SEM is estimated on a convenience sample of 610 university students enrolled at the Universities of Bologna and Parma. The model combines behavioural dimensions drawn

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from the MOA framework with the Eating-related Eco-concern questionnaire and the Sustainable Healthy Diet Index to account for relevant psychological and nutritional aspects affecting students' perceived value.

Findings – Results indicate that contextual opportunities – such as accessibility and socialization – are the primary drivers of students' perceived values of university canteens, while individual pro-environmental motivation and dietary orientation play a limited role, suggesting a potential gap between pro-environmental intentions and actual perception of the institutional food environment.

Research limitations/implications – The findings offer practical implications for institutional stakeholders and food service providers, highlighting the importance of matching communication and individual behaviour-oriented interventions with structural and contextual ones, to improve students' satisfaction and engagement with university canteens and to foster healthier and more sustainable eating practices among young adults.

Originality/value – This study contributes to the limited literature on university canteens as institutional food environments, particularly in the Italian context, where evidence on students' actual usage patterns remains scarce.

Keywords University canteens, Ecological concerns, Healthy eating, MOA, Food-related behaviour

Paper type Research article

1. Introduction

External food environments have been recognized as highly influential in shifting population diets towards healthy and sustainable food options (Pineda *et al.*, 2022). In this context, university canteens can be particularly supportive for younger generations, as higher education institutions are increasingly recognized as strategic actors in promoting sustainable and healthy options among university students (Krattenmacher *et al.*, 2023). Acting on such populations becomes particularly relevant as they experience the transition from adolescence, characterized by limited food autonomy, to adulthood, when dietary habits are formed more independently (Masserini *et al.*, 2024). At this stage of life, a notable decline in adherence to the Mediterranean diet has been observed (Obeid *et al.*, 2022; Ruggiero *et al.*, 2019). At the same time, young people report the highest levels of climate-related concern and eco-anxiety compared to older generations (Clayton and Karazsia, 2020; Hickman *et al.*, 2021; Rocchi *et al.*, 2023). These concerns, defined as distress and worry about environmental loss and its impacts (Coffey *et al.*, 2021) have emerged as important psychological drivers of environmental behaviour (Jain and Jain, 2022), including food-related choices (Qi *et al.*, 2022). Therefore, awareness of the environmental consequences of diets may drive sustainable dietary behaviours both at the individual level (Tecuta *et al.*, 2024) and within collective food settings (Kabasakal-Cetin, 2023).

In university canteens, the determinants of young adults' food behaviours are complex and multifaceted. Attitudes and self-efficacy towards healthy eating interact with interpersonal, environmental and structural levels, including peer influence, availability of nutritious foods and exposure to health-oriented initiatives. Consequently, multiple intrinsic and extrinsic factors affect students' dietary habits, including social networks, physical settings, policy-related elements and individual drivers, such as awareness of environmental issues (Downs *et al.*, 2020; Franchini *et al.*, 2023). However, it remains unclear whether pro-environmental psychological motivation effectively translates into everyday food choices within institutional food settings, such as university canteens.

A substantial body of research adopts cross-sectional and observational approaches to study students' food choices and behaviours, highlighting the role of taste, health motivations, dietary identity and socio-demographics (Aboueldahab *et al.*, 2026; Franchini *et al.*, 2024). In parallel, growing attention has been devoted to behavioural determinants of dietary quality, including cooking skills, nutritional and environmental knowledge, and lifestyle factors (Arrazat *et al.*, 2024). Moreover, university canteens are increasingly conceptualised as “choice architectures” leading to a growing number of experimental and quasi-experimental studies testing interventions such as nudging, menu design and pricing strategies to promote healthier and more sustainable food choices (Schneider *et al.*, 2023; Wongprawmas *et al.*, 2023). Evidence from systematic reviews suggests that such interventions generally yield small to moderate effects, with outcomes varying according to both intervention design and

individual characteristics (Pandey *et al.*, 2023), while economic instruments such as pricing policies can significantly affect canteen usage and, consequently, students' dietary behaviours (Masserini *et al.*, 2024).

Recently, theory-informed approaches and segmentation analyses have been introduced to better capture heterogeneity in students' motivations and behaviours, emphasizing the need for tailored and context-specific interventions (Kitunen *et al.*, 2019). Within this perspective, the present study applies an integrated theoretical framework in the Italian context.

2. Study context and objectives

Italian university canteens represent a structural component of student welfare systems, although systematic evidence on their actual use remains limited. National-level reports indicate that these facilities serve over four million meals daily, underscoring not only their scale but also their potential role in promoting health, social equity, food education and the transition towards more sustainable dietary practices (ANDISU, 2025). At the regional level, however, available evidence appears fragmented and often based on institutional or local surveys. In Emilia-Romagna, the Region targeted in this study, catering services of public universities are outsourced by the Regional Agency for the Right to Higher Education, and organized as an integrated system comprising canteens, affiliated food outlets and subsidized meal credits, frequently linked to student financial aid schemes. This organizational structure suggests high accessibility and the potential for regular use, particularly among students receiving economic support, although systematic data on frequency of use remains unavailable. Evidence from other Italian settings highlights heterogeneous usage patterns. For instance, findings from Tuscany suggest that a substantial share of students use university canteens only occasionally, with attendance influenced by factors such as perceived food quality, time constraints and spatial accessibility (Duranti *et al.*, 2019).

Despite the widespread availability and policy relevance of university dining services in Italy, official reports consistently point to a lack of comparable and comprehensive data on students' actual behaviours and usage patterns. This gap limits a thorough understanding of how these institutional food environments are experienced and evaluated by students, and to what extent they influence everyday dietary practices. In parallel, as literature converges on the importance of integrating individual, environmental and policy-level perspectives, research investigating the drivers of students' evaluation and satisfaction of university canteen systems, largely constrained by regulatory and organizational requirements, remains limited.

To address this gap, the present study conducts an exploratory analysis on a convenience sample of university students in the Emilia-Romagna region, Italy, to investigate the drivers of overall and economic perceived value of university canteens. The analysis draws on the motivation–opportunity–ability (MOA) framework to integrate individual drivers with external and environmental conditions. This approach provides a multidisciplinary perspective to examine how these dimensions jointly shape students' perceptions of university canteens, to inform targeted interventions and support decision-making processes in institutional food environments.

3. Materials and methods

3.1 Theoretical framework

The MOA theory (MacInnis *et al.*, 1991) is used in the present study as an inspiring conceptual lens to develop an exploratory analysis of students' perceived value of a university canteen's food environment, aiming to uncover the factors driving it, meaning both economic and overall satisfaction. MOA, used to analyse consumers' pro-environmental behaviours (Ölander and Thøgersen, 1995) distinguishes individual components, such as personal motivations to make decisions to achieve one desired outcome (motivation), or individual skills needed to transform the intention into concrete actions (ability), from external situations

favouring people to reach their desired target (Opportunities) (Kamboj *et al.*, 2025; Raimondo *et al.*, 2024).

The MOA framework has been widely applied in food behaviour research, where choices are shaped by both individual and contextual factors. Within this line of research, its applications range from intended behavioural outcomes, such as vegetarian or organic food consumption (Kamboj *et al.*, 2025; Zhu *et al.*, 2026), to unintended behaviour, such as household food waste (Vittuari *et al.*, 2021). This variety of applications suggests that MOA can be flexibly integrated with other relevant drivers affecting behaviours (Soma *et al.*, 2021). This feature makes the MOA well-suited to explore behaviour within institutional food environments, where the individual-environmental interaction may cause tension between behavioural drivers and contextual and structural characteristics. Alternative frameworks, such as the Theory of Planned Behaviour (Ajzen, 1991), the COM-B model (Michie *et al.*, 2011) and the Value–Belief–Norm theory (Stern, 2000) have also been widely applied to investigate food-related and sustainable behaviours at the individual level. These approaches provide relevant insights into intentional decision-making, moral norms, behaviour change processes, and the social and material dimensions of food practices. However, the present study required a framework able to simultaneously account for different dimensions and determinants, shaping students’ perceptions and experiences within institutional food environments.

Moreover, the framework was suitable to integrate the Eating-Related Eco-Concerns (EREC), which investigates the impact of ecological concerns on dietary behaviours, explaining, for instance, how preoccupations about environmental loss can lead to avoiding specific food-related behaviours (Qi *et al.*, 2022). Within this exploratory background, EREC is introduced as an antecedent of MOA to understand whether this psychological dimension can influence behaviour in a collective food environment. Lastly, a nutritional dimension – the Healthy Eating score (HE) – is introduced to control for students’ orientation toward healthier and more sustainable diets. These underlying relations are displayed in Figure 1.

3.2 Hypotheses formulation

This section aims to formulate research hypotheses that sustain the exploratory nature of the present study, testing the relative importance of individual versus contextual drivers. Following Figure 1, testable research hypotheses were formulated. The first hypothesis explores how the MOA components affect students’ perceived value, reflecting their overall satisfaction and perceived economic convenience. Motivation and ability are related to

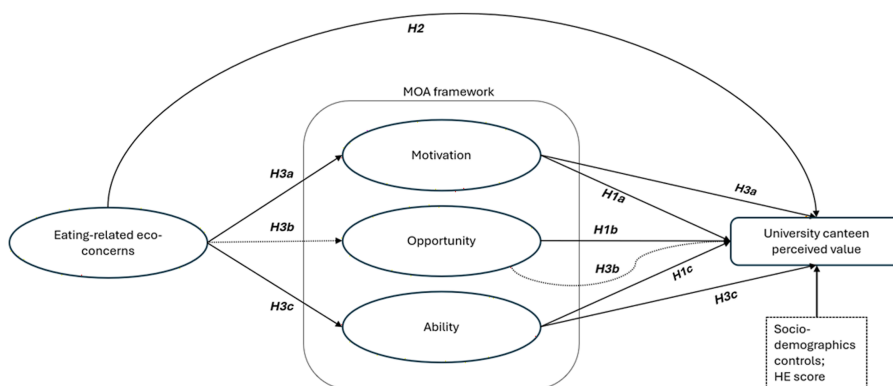


Figure 1. The theoretical framework. Source: Authors. Note: solid line represents a statistically significant expected effect; a dashed line indicates a non-statistically significant expected effect (i.e. H3b)

individual characteristics: interest and desire for “motivation”, and skills and proficiencies for “ability”; “opportunity” is instead related to perceived external factors. The formulated *a priori* hypothesis (H1) considers such elements, i.e. Motivation (H1a), Opportunity (H1b), Ability (H1c), as able to independently influence perceived value of canteens by university students.

The second and third sets of testable hypotheses investigate how EREC influences the perceived value of university canteens, either directly (H2) or indirectly (H3), through the MOA constructs. We assume that such concerns influence individuals’ motivation (H3a) and ability (H3c) without influencing external conditions shaping perceived opportunity (H3b).

3.3 Data collection and sampling procedure

Data on a convenience sample were collected through a survey administered to university students enrolled at the Universities of Bologna and Parma, Northern Italy, where students can access several university cafeterias and canteens at the campus and in the cities. As anticipated, canteen management is contracted by the same regional public entity. The two canteens located in Parma are managed by the same caterer and share a common structure, while the five canteens located in Bologna are managed by different catering services. Consequently, these canteens are not fully homogeneous in their food environment and dining experience, and students are not exposed to a perfectly uniform institutional food environment. Differences concern menu structures, menu format, degree of meal customization, and typology of meal offer, whilst prices are generally similar in compliance with regulatory requirements. This variability reflects real-world heterogeneity of institutional catering systems subject to the same bureaucratic and normative constraints and allows the collection of students’ perceptions and behaviour across different food environments.

University students were recruited online and given access to a 15-min online survey via a link in the posts and emails, as well as a QR code printed on the flyers and shared in university classrooms, hallways, and canteens at the universities of Bologna and Parma. The online survey was administered through a dedicated platform (Qualtrics software, Version 2.52.1 [November 2023] of Qualtrics Copyright © [2023] Qualtrics), where the participants’ IP addresses were not collected to ensure anonymity. Italian and English versions of the survey were available. Before starting the survey, participants were asked to read and consent to the data processing notice and to provide informed consent to participate in the study. Compensation was not offered for participation. Data collection took place between December 2023 and April 2024. Being an adult (≥ 18 years old) and being enrolled in one of the two universities were set as eligibility criteria to take part in the study. Canteen non-attendance was not an exclusion criterion and was rather used as a relevant perspective to assess barriers preventing students’ perceived value.

The survey consisted of three distinct sections (the self-reported questionnaire is available in the [Supplementary Material in Appendix B](#)). In the first section, 25 questions investigated the participants’ socio-economic condition (e.g. academic and working status, housing condition), food purchasing and preparation responsibility, and their physical health, including ponderal and weight status, and psychological health status. The second MOA-related section included 12 questions (35 items), in which the motivations, opportunities and abilities related to out-of-home eating were investigated, with a specific focus on university canteens. The questionnaire was developed by adapting items from the MOA framework previously applied in consumers’ food waste-related behaviour research ([Masotti et al., 2023](#)) and contextualizing them to the specific food environment under investigation. Motivation was captured through items addressing aspects related to awareness, attitudes and social norms. Ability was operationalized through skills related to shopping planning, meal planning, cooking and budget management. Opportunity included both temporal and contextual factors, such as time constraints and scheduling, as well as environmental conditions, including social interaction, availability of food options and time-saving opportunities. Motivation and

Opportunity questions, as well as canteen evaluation, were phrased differently for users (experience-based) and non-users (hypothetical/perception-based), ensuring that all respondents could provide meaningful answers. Respondents rated each item on a 7-point scale ranging from 1 (“Strongly disagree”) to 7 (“Strongly agree”).

Among the questions of the second section, a set of 7 items was dedicated to the EREC questionnaire. The recently validated Italian version (Tecuta *et al.*, 2024) of the ten-item EREC Questionnaire (Qi *et al.*, 2022) was utilized in this study in an abbreviated seven-item format, where 6 items in the original format were kept unmodified, and the remaining four original items related to food avoidance - avoiding meat, animal products, Genetically Modified Organisms (GMO) products and excessively packaged items - were consolidated into a single item. Respondents rated each item on a 5-point scale ranging from 1 (“Never”) to 5 (“Always”), with the total score calculated as the sum of all items. Higher scores reflect greater levels of EREC.

The third section consisted of the Healthy Eating (HE) sub-score of the SHED index (Tepper *et al.*, 2021). The SHED Index provides a comprehensive framework to evaluate diet sustainability, encompassing nutritional quality, dietary behaviours and pro-environmental practices. Its validity has been demonstrated in multiple studies, including Israeli (Tepper *et al.*, 2021), Turkish (Aksoy Canyolu *et al.*, 2024) and Portuguese populations (Liz Martins *et al.*, 2023). Furthermore, it has already been applied in studies focusing on university students in Italy (Wongprawmas *et al.*, 2023) and the United States (Franchini *et al.*, 2024) to investigate their food-related behaviours concerning nutritional, environmental and socio-cultural elements of healthy and sustainable diets. The HE sub-score consists of 10 items assessing preferences for animal and plant-based foods, including ultra-processed plant-based meat alternatives, low-sugar foods and beverages, and the use of salt and salty products. Responses were recorded on a 4-point Likert scale, from “Almost never true” to “Almost always true.” Scores ranged from 0 to 3, except for the first item, which was reverse-coded. The HE score (0–30 points) is obtained by summing all item scores, with higher scores indicating healthier food-related behaviours. Its alignment with established dietary models, such as the Mediterranean Diet and the EAT-Lancet reference diet (Tepper *et al.*, 2021), further supports its use as a measure of diet quality within the framework of sustainable dietary patterns.

A quality check was performed on the final sample data to avoid low-quality responses, following Jaeger and Cardello (2022) and Ward and Meade (2023) recommendations. As *a priori* screening, an instructed response item was inserted (i.e. to demonstrate that you are not a robot, please select “Rarely for this statement”). As *a posteriori* screening, subjects who took more than 60 min to complete the survey were excluded from the final sample as they were deemed to be careless (Lutig and Toepoel, 2016).

3.4 Data analysis

The normality of the data distribution was tested through the Kolmogorov–Smirnov test. The results were expressed as frequencies (%) or as means and standard deviations. Depending on the nature of the variable, chi-square tests and *t*-tests were used to explore differences across sub-samples defined by canteen exposure (users vs non-users) and enrolment year. Results are reported in the Supplementary Material (Table SA.1 and SA.2).

Given the exploratory nature of the present study, which combines scales adapted from other contexts to explore perceived value within an institutional food environment, an exploratory factor analysis (EFA) was conducted to investigate the underlying structure of the data. The analysis was performed using the psych package in R (Revelle, 2026), applying Principal Axis Factoring with oblimin rotation to account for shared variance and correlation among behavioural constructs. This analysis served as a diagnostic tool to identify and select items belonging to the five constructs envisaged by the theoretical framework: Motivation, Opportunity, Ability, EREC and Canteen Perceived Value.

Structural relations were assessed by means of Partial Least Squares Structural Equation Modeling (PLS-SEM), according to [Figure 1](#) and the testable hypotheses. The PLS-SEM was selected for its suitability in exploring a complex model integrating psychological and individual dimensions with contextual factors to explain the perceived value of a food environment. The PLS-SEM is also a flexible technique capable of handling both formative and reflective constructs. This approach has been increasingly adopted in food consumer research grounded in the MOA framework ([Raimondo et al., 2024](#); [Zhu et al., 2026](#)).

The PLS-SEM involves the estimation of a measurement and structural model. The measurement model examines the relationships between latent variables and the items they represent, assessing the reliability and validity of reflective constructs. In the present study, Opportunity and Ability were specified as formative constructs, as they are composed of distinct and complementary dimensions of contextual conditions and individual capabilities. Within each construct, items represent different aspects of the same domain; for this reason, items are not expected to be interchangeable or highly correlated. Ability is defined through multi-faceted food-related competencies, from meal planning to cooking and shopping skills, whose combination defines one student's overall ability that matters for appraising university canteens. These competences reflect food literacy and contribute to a student's culinary independence, a fundamental step for their emancipation and a bridge towards sustainable and healthy eating in adulthood ([Glover and Sumberg, 2020](#); [Slater et al., 2018](#)).

Similarly, Opportunity is specified as a formative construct composed of multiple contextual conditions deemed relevant by students (e.g. physical proximity, the social environment, and service characteristics) that jointly determine students' perceived value. Both constructs are thus formed by their indicators rather than being reflected by them, consistent with formative measurement specifications in structural equation modelling ([Jarvis et al., 2003](#)). The remaining constructs were specified as reflective, as their indicators are a homogeneous representation of a unique underlying latent trait: items are supposed to be correlated and interchangeable, and it is the latent construct that determines the observed items.

The structural model estimated the relationships among the constructs. Its validity is assessed in terms of statistical significance, evaluated with bootstrapped standard errors, the absence of critical multicollinearity and in-sample predictive power (measured by the model R^2). The model was initially estimated on the pooled sample of users and non-users; then, a multigroup analysis was estimated on the two subsamples to explore whether the drivers of actual or potential canteen perceived value differ by frequency or not. An additional group analysis was conducted to explore differences by distinguishing first-year students from others.

4. Results

4.1 The sample

Following [Cohen \(1988\)](#), the minimum sample size was assessed through an *a priori* power analysis for the most complex endogenous construct, using 10 predictors, $\alpha = 0.05$, power = 0.80, and a medium effect size ($f^2 = 0.15$). Being an exploratory analysis based on a convenience sample, with complex relations among the model constructs, a larger sample size was targeted to ensure more stable and reliable estimates of the model parameters. Of the 897 university students who consented and participated in the survey, 673 completed it. However, the final sample is represented by 610 students, still above the minimum size ($N = 118$), since some exclusions were made. Particularly, 22 participants failed to answer the attention question correctly; 25 participants took longer than 60 min to complete the survey ([Lugtig and Toepoel, 2016](#)), and 16 were identified as not being university students. Additionally, one participant was removed due to unrealistic BMI (70 kg/m², derived from a self-reported height and weight measure of 100 cm and 70 kg, respectively).

Significant differences between users and non-users can be observed among socio-demographic variables, particularly among being on scholarship ($p < 0.001$), housing conditions ($p < 0.001$), residence ($p < 0.001$) and food away from home frequency ($p = 0.006$). Significant differences also emerge among most survey items (Table SA.1 in the Supplementary Material).

4.2 PLS-SEM results: the pooled model

A preliminary exploratory factor analysis (EFA) was conducted to examine the underlying structure of the survey items (Supplementary Material, see Table SA.3). As stressed earlier, this analysis serves essentially as a diagnostic instrument to guide construct formation, as items are adapted to an institutional context and combined in an exploratory way. Within this EFA, the EREC dimension emerges as a clearly defined construct. Other items inspired by the MOA framework displayed cross-loadings or partial overlap across factors, suggesting a potential conceptual overlap between different dimensions of the framework. For these reasons, in the PLS-SEM, items with conceptual coherence and meaningful contribution to the corresponding construct were retained, assessed through outer weights and theoretical interpretability.

Motivation mainly emerges as a motivation for healthier (fruits and vegetables) and more sustainable (plant-based) eating. The item representing students' motivation to eat more animal-based meals was excluded from the analysis because of its cross-loading with other constructs. Opportunity consists of items capturing barriers or facilitators to the perceived value of the canteen. These are both concrete (i.e. reduced distance from the faculty) and intangible, such as the opportunity to socialize and reduce food waste. The item related to diet diversification was excluded for its cross-loading with Motivation. Ability reflects students' self-reported food independence from a cooking perspective (e.g. cooking skills, ability to prepare their meals in a balanced way and being responsible for their food preparation). Food shopping planning ability was excluded as this item does not provide a statistically significant unique contribution to the composite construct in the PLS-SEM specification.

Globally, the pooled model on the 610 observations exhibits an adequate fit (SRMS = 0.066, below the 0.08 threshold) (Lizcano-Prada *et al.*, 2026). Tables 1 and 2 report the results of the measurement model, which provides a more accurate assessment of fit in the context of PLS-SEM guidelines. EREC is characterized by a good internal reliability ($\alpha = 0.80$; $\rho_A = 0.90$; $\rho_C = 0.80$), suggesting that its items are internally coherent. Its AVE is just below the conventional 0.5 cut-off, suggesting weaker but still acceptable convergent validity. Items are characterized by different factor loadings, ranging from 0.424 to 0.870, reflecting the multidimensional nature of the construct, which includes both self-reported behaviours and attitudes.

Motivation consists of two items and is characterized by moderate reliability ($\alpha = 0.60$; $\rho_C = 0.70$) and good convergent validity (AVE = 0.54). The motivation to eat more plant-based food is characterized by the higher loading (0.933), suggesting that students' motivation primarily drives this item. Ability, modelled as a composite factor, is characterized by satisfactory loadings (all above 0.55), suggesting that all items contribute significantly to the construct, though to a different extent. The formative nature of the construct is coherent with ability formation: more capable university students, in the context of food-related behaviours, are more able to cook, plan their meals in a balanced way and are responsible for food purchases. Opportunity shows adequate factor loadings (from 0.62 to 0.76); this is modelled as a formative construct, suggesting that the factor increases students' demand for a physically accessible canteen, a place to socialize, and a place to reduce food waste. Lastly, the Canteen evaluation factor consists of two items related to students' perceived economic convenience and overall satisfaction, coherently reflecting the evaluative dimension of perceived value. In terms of loading, perceived economic value exerts the strongest influence on the construct. The factor is characterized by moderate reliability ($\alpha = 0.56$; $\rho_C = 0.58$) and relatively weak

Table 1. Measurement model: factor loadings

		Loading	Std. err	AVE	Alpha	ρ_A	ρ_C
Eating-related eco-concern	EREC_spending time for sustainable food	0.870***	0.041	0.46	0.8	0.9	0.8
	EREC_avoid specific food	0.825***	0.041				
	EREC_avoid food waste	0.467***	0.066				
	EREC_lead change in food habits	0.621***	0.049				
	EREC_care about the climate impact	0.768***	0.041				
	EREC_eat less	0.424***	0.065				
	EREC_avoid animal-based food	0.615***	0.054				
Motivation	Eat more vegetables	0.453***	0.043	0.54	0.6	0.8	0.7
Ability	Eat more plant-based food	0.933***	0.054				
	Cooking skills	0.586***	0.112				
Opportunity	To balance the diet	0.709***	0.095				
	Responsible for food prep	0.816***	0.070				
	To reduce waste	0.761***	0.076				
	To socialize	0.622***	0.094				
Canteen evaluation	To reduce physical distance	0.694***	0.099				
	Overall satisfaction	0.772***	0.051	0.42	0.6	0.6	0.6
	Perceived economic convenience	0.501***	0.045				

Note(s): Statistical significance as follows: *** 1%, ** 5%, * 10%. Opportunity and Ability are formative constructs. Composite reliability measured by ρ_A and ρ_C . Estimates were conducted using the csem package in R. Bootstrapped standard errors with 5,000 replications and 95% confidence intervals

Source(s): Authors

Table 2. Measurement model – HTMT

	EREC	Motivation	Canteen
EREC	1	0	0
Motivation	0.587	1.000	0.000
Canteen	0.010	0.047	1.000

Note(s): Heterotrait-Monotrait Ratio of Correlations (HTMT) among the reflective constructs. Discriminant validity is confirmed if ratios are below 0.85

Source(s): Authors

convergent validity (AVE = 0.42). These results indicate that the model is characterized by good reliability and acceptable convergent validity.

Table 2 shows that the reflective constructs are characterized by good discriminant validity, i.e. the constructs are empirically distinct. In fact, all correlation ratios are below the conventional 0.85 threshold (Henseler *et al.*, 2015). Within the structural model, all Variance Inflation Factor coefficients are below 5, suggesting the absence of critical multicollinearity (Zhu *et al.*, 2026).

Structural paths are reported in Table 3, together with the direct impact of relevant socio-demographic characteristics, including notable differences between users and non-users (see Supplementary Material Table SA.1). BMI class, though not systematically different in the two subgroups, was included in the analysis as it has been proven to be directly linked to university canteen-related behaviour in previous literature (e.g. Dias *et al.*, 2024; Ryan *et al.*, 2019). The list of socio-demographic variables also included the HE score, which is a composite measure of students' orientation towards a healthy diet (Slater *et al.*, 2018).

As shown in Table 3, the Canteen evaluation construct factor is primarily explained by Opportunity ($\beta = 0.359$, $p < 0.001$), supporting H1b and suggesting that contextual and

Table 3. Structural model – path coefficients

Path	Hypothesis	Coeff	S.E.	T-stat
Motivation → Canteen	H1a	0.037	0.078	0.471
Opportunity → Canteen	H1b	0.359***	0.052	6.891
Ability → Canteen	H1c	−0.022	0.073	−0.303
Eco-concern → Canteen	H2	0.042	0.073	0.571
Eco-concern → Motivation	H3a	0.557***	0.044	12.631
Eco-concern → Opportunity	H3b	0.061	0.057	1.059
Eco-concern → Ability	H3c	0.352***	0.036	9.710
<i>Socio-demographic variables</i>				
BMI class → Canteen		−0.096**	0.043	−2.250
Scholarship → Canteen		0.186***	0.046	4.027
Living place → Canteen		0.017	0.062	0.266
Food away from home → Canteen		−0.013	0.050	−0.259
Frequency → Canteen		0.349***	0.048	7.264
HE score → Canteen		−0.012	0.058	−0.214

Note(s): Statistical significance is as follows: ***, 1%; **, 5%; *, 10%. Estimates conducted using the csem package in R. Bootstrapped standard errors with 5,000 replications and 95% confidence intervals

Source(s): Authors

environmental characteristics such as physical accessibility, opportunities for socialization, and waste reduction play a crucial role in shaping canteen perceived value. By contrast, individual drivers of behaviour (motivation and ability) have no direct effect on Canteen evaluation. For this reason, H1a and H1c are both rejected. Since EREC has no direct effect on Canteen evaluation, H2 is rejected. A mediation analysis ([Supplementary Material, see Table SA.4](#)) reveals that EREC does not exert an indirect effect on canteen evaluation, reinforcing the absence of a behavioural translation of EREC.

Table 3 also shows how socio-demographic factors relate to canteen perceived value. Higher BMI classes (i.e. overweight or obese) are associated with lower perceived value of these food environments. By contrast, perceived value is significantly higher among scholarship holders. Family status - specifically living away from home - and frequency of food-away-from-home do not affect the Canteen factor. Frequency, i.e. exposure to the food environment, increases students' perceived value. Lastly, the HE score exerts no effect on the model outcome. The results of the PLS-SEM are displayed in [Figure 2](#).

4.2.1 Sub-group analysis. The PLS-SEM analysis was then replicated on the sub-groups of users versus non-users to verify whether the patterns observed were driven by different exposure to the canteen environment ([Table 4](#) and [Supplementary Material Figures SA.1-SA.2](#)). In the group analysis, opportunity is confirmed as the most relevant factor affecting actual or potential users' perceived value of the food environment, though with different magnitudes. Among users, the opportunity coefficient is greater (0.474 vs 0.365). EREC continues to support students' motivation to eat more sustainably, particularly among non-users (0.688 vs 0.523). EREC also increases students' food-related abilities, but similarly to the pooled model, these effects are not enough to implement significant positive canteen evaluation. The effect of socio-demographic characteristics confirms the relevance of holding a scholarship. Moreover, higher BMI status reduces the canteen's perceived value among users. Tests for multi-group comparisons suggested statistically significant differences, though results were not fully consistent across all tests [1], indicating that group differences are present but not robust. Nevertheless, perceived contextual opportunity remained the strongest predictor of canteen evaluation in both groups, though with different magnitudes.

An additional group analysis (presented in [Supplementary Material Table SA5](#)), was conducted on the subsamples of first-year versus other students. This revealed the stability of

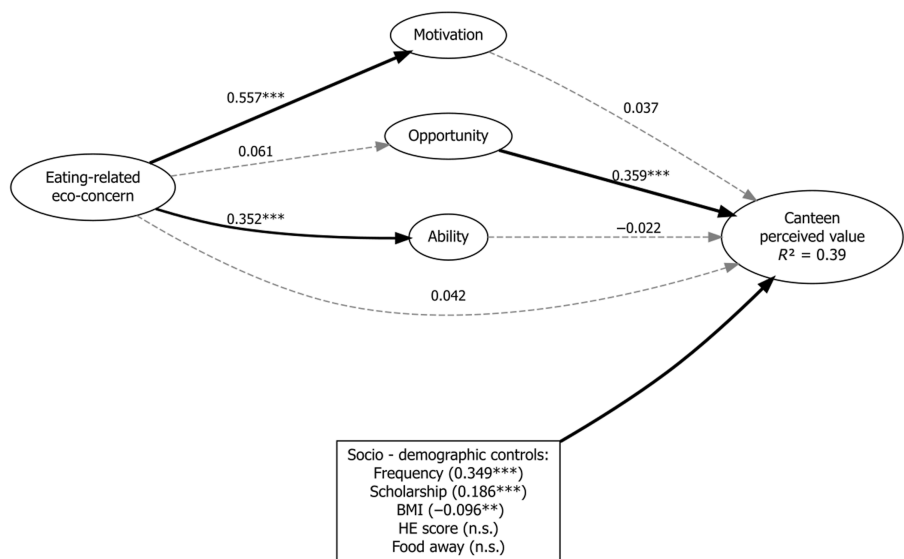


Figure 2. PLS-SEM results. Note: Solid lines indicate statistically significant results; dashed lines indicate non-statistically significant results. Statistical significance as follows: *** 1%, ** 5%, * 10%

Table 4. Structural model group analysis: users versus non-users

Path	Hypothesis	Non-users (<i>n</i> = 288)			Users (<i>n</i> = 322)		
		Coeff	S.E.	<i>T</i> -stat	Coeff	S.E.	<i>T</i> -stat
<i>Direct paths</i>							
Motivation → Canteen	H1a	0.066	0.193	0.343	0.216	0.157	1.377
Opportunity → Canteen	H1b	0.365***	0.099	3.669	0.474***	0.084	5.681
Ability → Canteen	H1c	−0.147	0.183	−0.802	0.018	0.100	0.183
Eco-concern → Canteen	H2	−0.052	0.164	−0.315	−0.005	0.113	−0.045
<i>Indirect paths</i>							
Eco-concern → Motivation	H3a	0.688***	0.052	13.250	0.523***	0.072	7.313
Eco-concern → Opportunity	H3b	0.098	0.080	1.234	0.103	0.085	1.208
Eco-concern → Ability	H3c	0.296***	0.086	3.439	0.401***	0.046	8.798
<i>Socio-demographic</i>							
BMI class → Canteen		−0.086	0.076	−1.129	−0.139**	0.068	−2.039
Scholarship → Canteen		0.297***	0.083	3.572	0.158**	0.063	2.513
Living place → Canteen		0.095	0.104	0.919	−0.022	0.090	−0.241
Meals away → Canteen		0.018	0.096	0.186	−0.067	0.074	−0.903
HE score → Canteen		−0.004	0.117	−0.030	−0.079	0.090	−0.877

Note(s): Statistical significance is as follows: *** 1%, ** 5%, * 10%. Estimates were conducted using the *csem* package in R. Bootstrapped standard errors with 5,000 replications and 95% confidence intervals

Source(s): Authors

the structural model and the robustness of opportunity. Among socio-demographic variables, a notable difference emerges for frequency, which is a more pronounced driver of canteen perceived value among more senior students, a result which further reinforces the idea of cumulated exposure observed in the pooled model.

5. Discussion and study implications

The present study explores the role of individual and contextual drivers in shaping university students' perceived value within an institutional food environment, such as university canteens in Bologna and Parma. The focus is not merely related to canteen frequency but rather considers subjective evaluation stemming from overall satisfaction and perceived economic convenience. Our analysis draws from the MOA framework, which provides a suitable theoretical lens to examine the joint effect of individual and contextually dependent perceptions. In the present study, the MOA is integrated with a climate-related psychological dimension (EREC), introduced as an antecedent of the MOA factors, and a nutritional orientation (the HE score), introduced as a final control.

EREC is associated with ethical, moral and environmental motivations for dietary choices (Tecuta *et al.*, 2024), but has been only rarely explored in collective food environments like university canteens (Kabasakal-Cetin, 2023). The HE score (Tepper *et al.*, 2021), associated with healthy and sustainable dietary patterns such as the Mediterranean Diet and the Planetary Health Diet (Willett *et al.*, 2019), is introduced as a socio-demographic reflecting individual orientation toward sustainable and healthy eating (Slater *et al.*, 2018). Overall, this integrated perspective helps exploring how individual predispositions and habits and external opportunities could jointly influence the perceived value of university canteens by students.

The structural model suggests an asymmetric pattern between personal drivers (motivation and ability) and external opportunities. Opportunity emerges in fact as the primary driver of students' perceived value of the institutional food environment. Opportunity encompasses a holistic concept of university canteens, from physical accessibility, in terms of reduced distance from the faculty, to the possibility of socializing and reducing food waste. This finding suggests that students are satisfied by an environment that acts not only as a food provider but rather as a multifunctional environment, combining convenience, nutritional variety and social opportunity. The strength of opportunity emerges unambiguously in real-life settings, where food environments are characterized by substantial heterogeneity in terms of menu structures and facilities. Food service providers must operate under regulatory constraints and predefined contractual economic and service conditions (ANDISU, 2025; European Commission, 2019), which may limit flexibility in service design and adaptation to users' preferences. These constraints might explain why, in this study, canteen perceived value is primarily driven by contextual opportunities rather than individual drivers.

Beyond exploring students' perceived value, these findings could also provide a novel theoretical perspective on the formation of perceived value and satisfaction within institutional food settings. Previous studies have mainly emphasized the role of individual and personal aspects (motivations, nutritional awareness and dietary identities) as key determinants of food-related behaviours (Franchini *et al.*, 2024; Aboueldahab *et al.*, 2026; Arrazat *et al.*, 2024). The findings from this study suggest that their explanatory power could become less relevant when evaluations and choices are embedded within regulated institutional food environments. In these contexts, external opportunities (accessibility, convenience and social interaction) appear to outweigh individual motivations. These findings suggest that the relative importance of the MOA dimensions is not fixed but depends on the decisional context, with opportunity becoming the main explanatory dimension in the structured institutional food environments considered in this study. This novel perspective has the potential to broaden the range of possible applications of the MOA framework, as the explanatory relevance of its dimensions is found to be contingent upon the institutional context in which food-related evaluations are formed. These findings have potentially practical implications for stakeholders operating at different governance levels, from catering providers and university administrators to institutional policy-relevant actors. The results suggest that initiatives strengthening the contextual attributes of university canteens – including accessibility, convenience and opportunities for social interaction – have the potential to enhance students' engagement with university dining services, increase satisfaction, and ultimately support healthier and more sustainable dietary behaviours.

Although a significant effect of individual drivers (Motivation and Ability) does not emerge from this study, the inclusion of EREC within the MOA framework provides additional insight into the role of psychological dimensions and individual drivers of behaviour. Specifically, EREC had no direct effect on canteen perceived value; it significantly shaped students' motivation and ability, a result which is robust across alternative model specifications. From this perspective, EREC can be an indirect driver of food-related individual behavioural change, further supporting the misalignment between students' expectations and actual perceived value. The effect of EREC is, in fact, limited to motivation and ability, without translating, either directly or indirectly, into concrete satisfaction with the food environment. This finding points to a potential gap between intention and the food environment proposal and conditions. The group analysis confirms this gap, which is particularly pronounced among non-users, who, on average, appear more motivated than users to engage in healthier and more sustainable food behaviours. However, motivation is not sufficient to overcome perceived barriers and influence the perceived value of the food environment. By contrast, for regular canteen users, canteen evaluation is primarily shaped by perceived contextual and structural characteristics of the food environment, which can be chosen for its social value and convenience, rather than by individual motivation for sustainable and healthy diets.

These results suggest that students may seek alternative food environments or perceive university canteens as less capable of fulfilling their expectations for healthy and sustainable eating. Considering the growing awareness of nutritional quality together with the sustainability standards already embedded in collective catering through regulatory requirements (Franchini *et al.*, 2023; Schaubroeck *et al.*, 2018), one possible explanation is that the nutritional and environmental attributes of university meals are not effectively communicated to students by catering providers (Schneider *et al.*, 2023). From a practical perspective, these findings suggest that university canteens and catering providers should strengthen communication strategies aimed at increasing students' awareness of the health and sustainability attributes of the meals provided. Improving the visibility of information related to nutritional quality, environmental impacts, ingredient sourcing and sustainability certifications could help reduce the gap between students' expectations and their perceived experience, thereby increasing the attractiveness of university canteens for health- and sustainability-oriented students (Keat *et al.*, 2024). At the same time, communication alone may not be sufficient. Catering services are also encouraged to continuously innovate menu designs by expanding and diversifying plant-based options (Krattenmacher *et al.*, 2023), increasing transparency regarding food origin and sustainability certifications, and offering nutritionally balanced meals that better reflect students' evolving preferences. Together, these initiatives, in the context explored by the present study, could help bridge the observed mismatch between students' pro-environmental motivations and their evaluation of university canteens, ultimately enhancing both perceived value and overall satisfaction.

Finally, the exploratory nature of the present study comes with some limitations. First, the use of scales re-adapted from other fields of food consumer research resulted in some local internal inconsistencies in the formation of the latent constructs. Then, the tension between individual and contextual drivers of perceived value with university canteens emerges from a convenience sample of university students in a geographically restricted area covered by the survey, which suggests that the structural relations uncovered might reflect more local environments and might not be directly generalized at the national level. Considering these limitations and recalling the exploratory nature, the present study serves as a first, theory-informed modelling exercise to explore factors shaping value formation rather than being a confirmation of previously validated constructs and relations. Future research is needed to validate this exercise in other geographical areas and on a more representative scale; this would provide insightful feedback for the involved stakeholders to better promote and enhance students' engagement and satisfaction.

6. Conclusion

This study advances the literature on students' perceived value of the university canteen food environment, with a focus on the Italian case study, by integrating the MOA framework with psychological and nutritional dimensions. Embracing a broad perspective is particularly valuable when exploring complex behaviours and choices, not exclusively shaped by economic convenience, but also by individual and contextual factors, especially among young adults facing both a decline from Mediterranean Diet guidelines (Silva *et al.*, 2025) and increasing climate anxiety (Tavolacci and Ladner, 2024).

The findings provide useful guidance for decision-making processes related to the design and management of university canteens (Lorenz and Langen, 2017). They support the development of behavioural interventions aimed at promoting healthier and more sustainable eating habits among students, while also offering insights for food service providers and institutional actors to enhance the attractiveness and effectiveness of canteen services (Silva *et al.*, 2025). Furthermore, the study highlights the importance of involving students in participatory and co-design approaches, ensuring that future canteen innovations are aligned with their needs and preferences, thereby facilitating a transition toward more sustainable dietary practices (Assilian *et al.*, 2024).

Importantly, the results emphasize the role of structural conditions in shaping food-related behaviours within institutional settings. Efforts to promote healthy and sustainable practices should therefore go beyond individual-level interventions and be embedded in broader structural changes. Future research should extend this analysis to more diverse populations and contexts, further exploring the interplay between individual drivers and perceived environmental opportunities. Overall, the study underscores the need to move beyond an individual-centred view of satisfaction, recognizing structural and contextual factors as key enablers or barriers in the formation of perceived value.

Ethical statement

This research study was approved by the Board for the Ethics of Non-Medical Research Involving People of the University of Parma (prot. n. 0254687 delivered on September 26th, 2023) and the University of Bologna (prot. n. 0208865 delivered on September 26th, 2023).

Declaration of AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used ChatGPT (OpenAI) to improve readability and language. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content.

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Note

1. The Chi-square test reported non-significant differences.

Supplementary material

The supplementary material for this article can be found online.

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