



Insights into parents' and teachers' support for policies promoting increased plant-based eating in schools

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ABSTRACT

Global environmental and public health challenges related to current food systems call for large-scale shifts towards increasingly plant-based diets, especially in Western meat-centric societies. School meal systems can play a role in these changes due to their widespread prevalence and multi-sectoral impact. However, there is a lack of evidence about how adults involved in the school meals system perceive school-based pro-environmental food policies, which limits the ability to align those policies with the needs and expectations of the school community. This study aimed to address this knowledge gap by exploring parents' ($n = 104$) and teachers' ($n = 252$) support for policies to promote increased plant-based eating in public schools in a highly meat-centric EU country (Portugal). Overall, teachers seemed to be slightly more supportive of such policies and displayed more favorable (injunctive and dynamic) norms toward plant-based eating, more negative appraisals of meals with meat (i.e., perceived healthiness, naturalness, and sustainability), and lower attachment to meat consumption. Furthermore, injunctive norms in favor of plant-based meals were linked with higher support for measures promoting plant-based meals in schools, in both samples (parents, teachers). Lower meat attachment and favorable perceived meal attributes (e.g., perceptions about plant-based and fish meals) were associated with teachers' support for measures promoting plant-based meals in schools. These findings suggest that future efforts and research with parents and teachers to enable less meat-centric and more flexitarian food practices in schools should consider social and motivation variables relevant to plant-forward transitions.

1. Introduction

The current global food system is linked with significant environmental impacts (e.g., climate change, land use, biodiversity loss) and a non-optimal response to human dietary needs (Bhat et al., 2019; Poore & Nemecek, 2018; Shepon et al., 2018; Springmann et al., 2018; Springmann & Freund, 2022; UNICEF, 2020). Recent findings and reports have called for a transformation of the food system toward accessible and more sustainable dietary patterns that promote both human health and the ecological safety of the planet (e.g., Intergovernmental Panel on Climate Change report – IPCC, 2022; Planetary Health Diet, Willett et al., 2019; Tufford et al., 2023). Compared to animal-sourced products, plant-based foods are usually linked with lower environmental impact including decreased land and freshwater use, reduced greenhouse-gases

emissions, and lower eutrophication and acidification potential (Chai et al., 2019; Clark et al., 2022; Eshel et al., 2014; Hayek et al., 2021). Thus, the transformation of the food system is supported by a transition toward increasingly plant-based diets, especially in more economically developed countries, to rely on higher consumption of lower-impact foods, such as vegetables, whole grains, and fruits, and lower consumption of animal products and refined carbohydrates (IPCC, 2022; Oostindjer et al., 2017; Springmann et al., 2021; Stoll-Kleemann & Schmidt, 2017; Willett et al., 2019).

School meals have been proposed as a relevant platform to help accelerate sustainable food transitions, by involving children and adolescents across different cultural and socio-economic backgrounds, as well as their families and communities (Angeles-Agdeppa et al., 2019; Graça et al., 2022; Kos & Jerman, 2019; Roque et al., 2022;

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Savoie-Roskos et al., 2017). The school meals system plays a significant role in the global food complex, with around 370 million children receiving a school meal a day worldwide (UNICEF, 2020). Furthermore, school meals have a multi-sectoral influence over society, from direct educational and public health benefits to economic and agricultural productivity, environmental sustainability, and social protection (Anderson et al., 2018; Bundy et al., 2017; Colombo et al., 2020; Fiese et al., 2019; Oostindjer et al., 2017; Roque et al., 2022; Verguet et al., 2020).

Despite the potential of the school meals system to help enable food sustainability transitions, these changes will not happen automatically. For example, meat-centric representations of a proper meal, lack of food literacy, and inadequate offer of plant-based meals have been identified as important barriers to change specifically in the school context (Graça et al., 2022). Several meat curtailment policies, in the form of public legislation, taxes and subsidies, and institutional pledges, have been proposed to reduce the excessive production and consumption of animal-sourced products (Aiking & de Boer, 2018; Carvalho et al., 2022; Clark & Tilman, 2017; de Boer & Aiking, 2018; Godfray et al., 2018; Graça et al., 2020; Michielsen & van der Horst, 2022; Neff et al., 2018; Van Loo et al., 2017; Vinnari & Vinnari, 2014; Whitley et al., 2018). Developing and implementing those policies requires coordinated efforts between governing bodies, market actors, and civil society, as well as support from the groups and individuals who are directly or indirectly affected by such changes (Batel & Devine-Wright, 2015; Doucet et al., 2007; Godfray et al., 2018; Whitley et al., 2018). However, recent research suggests that political and ideological polarization may compromise attempts to promote sustainable food transitions at the level of practice and policy, and that both governmental and non-governmental organizations may need to legitimize the importance of meat reduction across meal settings including restaurants and canteens (de Boer & Aiking, 2021a; 2021b, 2022). Teachers and families of school-aged children have been identified as stakeholders in the school meals system (Cardoso et al., 2019; Graça et al., 2022; Illøkken et al., 2021; Meier et al., 2022; Ohri-Vachaspati, 2014); but to the best of our knowledge, no studies have yet systematically investigated their perceptions about school-based policies to reduce meat consumption and promote increased plant-based eating. The lack of evidence on this matter limits the ability to align sustainable food transitions in schools with the needs and expectations of the school community, which may arguably delay those transitions due to a lack of engagement.

1.1. The present work: aim, context, and framework

The present work aimed to gain insight into parents' and teachers' perceptions about measures to promote increased plant-based eating in schools. We focused on public schools in the Portuguese context, which like many other European countries has a highly meat-centric food culture (Brittin, 2011). This meat-centric culture is reflected in the standard offer of the school meals system, in which school meals rotate daily and interchangeably between meat and fish as the center of the plate protein sources. Against this backdrop, we wanted to explore whether a set of variables known to be relevant for meat reduction and plant-based eating would also be linked with parents' and teachers' support for increased plant-based eating in schools.

To select those variables, we drew on an integrative behavior change framework that establishes links with additional research in the field of meat reduction and plant-based eating. We used the COM-B system (Michie et al., 2011), which defines behavior change as resulting from the interplay between capability to change (e.g., knowledge), opportunity to change (e.g., a conducive social environment), and the motivational processes required to drive change (e.g., decision making) (Michie et al., 2011, 2014, pp. 1003–1010). The COM-B system has been increasingly used to enable interdisciplinary dialogue within the topic of dietary change in general and plant-forward transitions in particular (Grassian, 2020; Onwezen, 2022; Sijtsema et al., 2021; Timlin et al.,

2021). The COM-B system has also been used in a systematic review of barriers and enablers to reduce meat consumption and follow more plant-based diets (Graça et al., 2019). Among other variables, the review identified a lack of knowledge and difficulty in acquiring reliable information as barriers in the capacity domain, and prejudice and adverse norms against plant-based eaters as barriers in the opportunity domain. In the motivation domain, attachment to meat consumption and favoring attributes of meat-centric meals (e.g., taste) were identified as relevant barriers, whereas favoring attributes of plant-based meals (e.g., sustainability) and a general concern regarding health and environmental issues were identified as relevant enablers (Graça et al., 2019).

Building on this conceptual framework, the current study provided the first exploration into the links between these variables and parents' and teachers' support for policies promoting plant-based eating in schools. We expected to find positive associations between policy support and perceived knowledge and access to information about sustainable food consumption, perceived favorable attributes of plant-based meals, and general health and environmental concerns. In contrast, we expected to find negative associations between policy support and attachment to meat consumption, as well as perceived favorable attributes of animal-sourced meals. We also explored whether teachers and parents showed similar or dissimilar scores on each of these target variables.

2. Methods

2.1. Participants and procedure

We used a convenience sampling approach to collect data from teachers and parents or caregivers of children studying in public schools. Despite the exploratory nature of the study, to minimize bias we avoided relying on personal networks and social media to recruit participants; hence, we used a public database of school email addresses available online to send an announcement (email) looking for schools who would be willing to forward the invitation for our survey via the school's mailing lists. As an incentive, we offered schools and participants the opportunity to take part in a draw to win several monetary prizes (vouchers) – one for schools that forwarded the invitation (1200€), one for teachers (100€), one for parents/caregivers (100€). Eight schools from six different districts geographically spread throughout the country, from rural and urban areas, accepted to send a recruitment message to their mailing lists. The message invited teachers and parents/caregivers to participate in “a study about school meals” by filling out an online questionnaire about their opinions on “healthy and sustainable food practices in the school context”. The questionnaire was hosted on Qualtrics and was open for a period of six months (January to June 2021). The research team did not have direct contact with prospective participants, as the recruitment process was entirely mediated by the schools. Nevertheless, informed consent was obtained at the start of the questionnaire as a pre-requisite for participation.

In the teachers' sample ($n = 252$ participants), most participants identified as female (83.7%), with ages ranging between 33 and 67 years old ($M = 51$; $SD = 7.5$). Almost all teachers reported following an omnivore diet (96.4%), followed by a vegetarian/vegan diet (2.4%) and a pescatarian diet (1.2%). Most teachers had a bachelor's degree (79.4%), with an average of 26 years of experience working as teachers ($SD = 8.8$). In the parents/caregivers sample ($n = 104$), most participants identified as female (89.4%), and were between 27 and 56 years old ($M = 40.2$; $SD = 5.62$). Almost all parents/caregivers that participated in the study reported following an omnivore diet (95.1%), and a small percentage reported following a vegetarian/vegan diet (3.9%) or a pescatarian diet (1%). Regarding their education, most had completed up to basic (20.2%) or secondary education (46.2%), and a third of the sample had obtained a higher education diploma (26% had a bachelor's degree, 7.7% had a master's degree). All parents/caregivers had at least one school-aged child attending a public school when they responded to

the questionnaire.

2.2. Instruments

The measures were selected and developed based on the review that guided the conceptual development of this study (Graça et al., 2019). More specifically, we targeted relevant variables that were mentioned earlier in the introduction under each of the COM-B domains (i.e., capability variables were knowledge and access to information about sustainable food consumption; opportunity variables were social norms and social representations in the school context; motivation variables were perceived meal attributes, meat attachment, and health and environmental concerns). The outcome variable was support for school-based policies to promote plant-based eating. In the Portuguese school meals system, vegetarian meals are formally defined as meals with no animal products, whereas meals that do not include meat or fish but include dairy and eggs are formally defined as ovo-lacto-vegetarian meals. For the sake of parsimony, we did not distinguish between the two types of meals – instead, we used the nomenclature “vegetarian meals” throughout the questionnaire and did not provide any formal or informal definitions to participants. The study was conducted in Portugal and all questions were in the Portuguese language. The variables were measured in the order they are presented below.

Perceived knowledge about sustainable food consumption. We provided a simple definition of the concept of sustainable food consumption – i.e., “Sustainable food consumption is that which promotes better use of natural resources and fewer negative consequences for the environment (e.g., pollution, water scarcity, global warming)” – and used one item to measure perceived knowledge about the topic: “I know which aspects

determine the environmental sustainability of food consumption”, with a 5-point scale, from 1 (*Completely disagree*) to 5 (*Completely agree*).

Perceived access to information about sustainable food consumption. We referred to the definition presented above and measured perceived access to information about sustainable food consumption with one item: “To what extent do you consider you have access to information on sustainable food consumption?”, using a 5-point scale, ranging from 1 (*Little access to information*) to 5 (*Much access to information*).

General and specific perceptions about meat, fish, and vegetarian meals. General and specific perceptions about these three types of meals were evaluated with six meal traits (5-point bipolar scales; dislike vs. like, unhealthy vs. healthy, unnatural vs. natural, not sustainable vs. very sustainable, very difficult to prepare vs. very easy to prepare, very cheap vs. very expensive) for each type of meal (meat, fish, vegetarian). We computed a general score for each meal (Cronbach’s alpha ranged between .63 and .78, see Table 1 for scores per sample and meal) but we also considered each trait individually in a separate analysis to enable a more fine-grained assessment for each type of meal.

Social Norms. We measured three norms regarding the consumption of plant-based meals – descriptive norm (“In general, in my school community, people consume vegetarian meals regularly”), injunctive norm (“In general, in my school community, people should consume vegetarian meals regularly”), and dynamic norm (“In general, in my school community, people are increasing their consumption of vegetarian meals”). Participants were asked to report to what extent they agreed with each sentence, on a 5-point Likert scale, from 1 (*Completely disagree*) to 5 (*Completely agree*).

Social Representations. We measured social representations about vegetarians with a total of six items (“In general, vegetarian people are

Table 1
Descriptive statistics and comparisons between groups.

Domains	Variables	Teachers’ sample			Parents’ sample			Comparisons
		M	SD	α	M	SD	α	t
Capability	Support for policies promoting increased plant-based eating	4.19	.59	.81	3.87	.62	.81	4.63***
	Perceived knowledge about sustainable food consumption	3.76	.87		3.76	.69		.01
	Perceived access to information about sustainable food consumption	3.38	1.01		3.22	1.2		1.21
Opportunity	<i>Social Norms</i>							
	Descriptive norm	2.40	.92		2.45	1.01		-.46
	Injunctive norm	3.62	.91		3.38	.93		2.24*
	Dynamic norm	3.16	.94		2.77	1.04		3.50***
	<i>Social Representations</i>							
	Warmth	2.90	.79	.96	2.94	.77	.85	-.40
Motivation	Competence	2.93	.77	.96	3.05	.82	.90	-1.36
	Vitality	3.11	.65	.65	3.19	.82	.80	-.93
	<i>General perceptions about meals</i>							
	<i>Meat meals</i>							
	Dislike vs. like	2.98	.49	.67	3.17	.53	.65	-3.13**
	Unhealthy vs. healthy	3.39	1.01		3.54	1.05		-1.28
	Unnatural vs. natural	2.75	.78		3.00	.85		-2.60*
	Unsustainable vs. sustainable	2.82	.84		3.08	.89		-2.62**
	Difficult to prepare vs. easy to prepare	2.30	.87		2.99	1.08		-6.16***
	Cheap vs. expensive	3.76	.85		3.52	1.03		2.17*
	<i>Fish meals</i>							
	Dislike vs. like	3.16	.78		3.18	.87		-.28
	Unhealthy vs. healthy	3.44	.47	.67	3.49	.54	.78	-.84
	Unnatural vs. natural	4.14	.91		3.83	1.12		2.71**
	Unsustainable vs. sustainable	4.09	.75		4.23	.90		-1.43
	Difficult to prepare vs. easy to prepare	3.66	.82		3.66	1.01		0.02
	Cheap vs. expensive	3.20	.84		3.43	.93		-2.22*
	<i>Vegetarian meals</i>							
Dislike vs. like	3.54	.92		3.72	.97		-1.63	
Unhealthy vs. healthy	3.95	.84		3.95	.96		-.013	
Unnatural vs. natural	3.59	.55	.63	3.52	.62	.67	0.91	
Unsustainable vs. sustainable	3.48	1.20		3.26	1.19		1.57	
Difficult to prepare vs. easy to prepare	4.26	.78		4.15	.94		1.11	
Cheap vs. expensive	4.14	.78		3.96	.91		1.89	
<i>Meat attachment (dependence)</i>								
Health concern	3.97	.76		3.85	1.04		1.16	
Environmental concern	3.30	1.08		3.26	1.19		.35	
	3.60	.91		3.60	1.14		.00	
	2.52	.86	.89	2.80	.91	.92	-2.78**	
	3.89	.85		3.90	.84		-0.15	
	3.90	.87		3.72	.79		1.82	

Notes: M = Mean, SD=Standard Deviation, α = Cronbach’s Alpha, t = t-value (t-test). * $p < .05$; ** $p < .01$; *** $p < .001$.

...”), targeting the dimensions of warmth (“warm”, “sincere”; Fiske et al., 2002), competence (i.e., “intelligent”, “competent”; Fiske et al., 2002), and vitality (“healthy”, “strong”). Participants were asked to what extent they agreed with each descriptor on a 5-point scale (1 = *Completely disagree* to 5 = *Completely agree*; Cronbach’s alpha ranged between .65 and .96, see Table 1 for scores per sample and dimension).

Health and environmental concerns. One item was used to assess participants’ concern about the impact of their choices on their health (“In my daily life, I always consider how my choices impact my health”), and one to assess participants’ concern about the impact of their choices on the environment (“In my daily life, I always consider how my choices impact the environment”). Participants were asked to rate their agreement with each sentence on a 5-point scale, ranging from 1 (*Completely disagree*) to 5 (*Completely agree*), with higher scores reflecting greater concern for the impact of their choices on their health and the environment.

Meat attachment. Meat attachment was assessed with the five-item dependence subscale from the Meat Attachment Questionnaire (MAQ; Graça et al., 2015). We used this subscale instead of the full (16-item) MAQ to ensure parsimony, as it is conceptually aligned with the construct, and the original questionnaire development and validation studies showed it surpassed the other three subscales in terms of predictive ability and yielded identical findings to the full (16-item) version (Graça et al., 2015). The subscale comprises five items (“I don’t picture myself without eating meat regularly”, “If I couldn’t eat meat I would feel weak”, “I would feel fine with a meatless diet” [reverse coded], “If I were forced to stop eating meat I would feel sad”, “Meat is irreplaceable in my diet”). Participants were asked to rate their agreement with each item using a 5-point scale (1 = *Completely disagree* to 5 = *Completely agree*; $\alpha_{teachers} = .89$, $\alpha_{parents} = .92$).

Support for school-based policies to promote plant-based eating. Support for policies to promote plant-based eating in schools was measured with four items taken and adapted from Carvalho et al. (2022) (i.e., “To what extent would you agree with implementing each of the following measures in [your school/your child’s school]: Make vegetarian meals more appealing and tastier, Provide information (e.g., educational content, posters, leaflets, videos) about the environmental impact of school meals, Increase the offer of plant-based products in school vending machines, Increase the number of vegetarian meal options in the school canteen”). A principal component analysis of these four items showed they formed a single factor in both samples ($Eigenvalue_{teachers} = 2.56$, Percentage of variance_{teachers} = 64.01%; $Eigenvalue_{parents} = 2.55$, Percentage of variance_{parents} = 63.76%). The items were measured with a 5-point scale (1 = *Completely disagree* to 5 = *Completely agree*; $\alpha = .81$ in both samples).

Sociodemographic variables and dietary category. At the end of the survey, we measured basic sociodemographic variables (e.g., age, gender, education) and asked participants to classify their diet (“How do you classify your diet?”) with three response options (“Omnivore”, “Vegetarian”, “Other: ___”).

2.3. Data analysis

To explore the associations between the targeted variables and support for policies promoting increased plant-based eating in the school context, we conducted descriptive analyses and multicollinearity diagnostics, followed by a set of hierarchical linear regressions using SPSS v.28 in which sociodemographic variables were entered in the first step, followed by a block with capability variables, a block with opportunity variables, and a block with motivation variables. The models were tested and presented separately for each sample. We also tested the meal traits for each type of meal on a separate simple regression analysis to enable a more fine-grained understanding of the links between meal-related perceptions and policy support. In addition, we compared the mean scores for each variable of the two samples with independent samples t-tests.

3. Results

3.1. Descriptives and comparisons between groups

Table 1 presents the descriptives and comparisons between the two samples. Overall, both samples showed moderate but positive scores on most capability, opportunity, and motivation variables measured in the study, as well as support for policies promoting increased plant-based eating in their schools. Nevertheless, teachers seemed to be generally more favorable than parents and displayed higher perceived (injunctive and dynamic) norms in favor of plant-based eating, more negative appraisals of meals with meat (i.e., perceived healthiness, naturalness, and sustainability), and lower attachment to meat consumption.

3.2. Teachers’ sample

No collinearity problems were detected in the analyses (VIF ranged from 1 to 2.37; tolerance values ranged from 0.42 to 1). The results are presented in Table 2. In the first model, referring to the sociodemographic variables, the only significant association was with gender, in which men showed lower support for measures to promote plant-based eating than women. The second model, pertaining to the capability variables, did not add explanatory capacity to the analyses. In the third model, referring to opportunity variables, injunctive norms about eating vegetarian meals showed a significant positive association with policy support. In the fourth model, referring to motivation, attitudes toward

Table 2 Teachers’ correlates of support for policies promoting plant-based eating in their schools.

Variables	β	ΔR^2	ΔF	Δdfs
<i>Sociodemographic variables</i>		.03	3.387*	2, 222
Gender	-.154*			
Age	.069			
<i>Capability</i>		.003	.316	2, 220
Perceived knowledge about sustainable food consumption	.053			
Perceived access to information about sustainable food consumption	.000			
<i>Opportunity</i>		.078	3.118**	6, 214
<i>Social Norms</i>				
Descriptive norm	.028			
Injunctive norm	.216**			
Dynamic norm	.089			
<i>Social Representations</i>				
Warmth	-.225			
Competence	.159			
Vitality	-.016			
<i>Motivation</i>		.108	4.809***	6, 208
<i>General perceptions about meals</i>				
Meat meals	.138			
Fish meals	-.192**			
Vegetarian meals	.158*			
Meat attachment (dependence)	-.271***			
Health concern	.121			
Environmental concern	-.161*			

Notes: β = Standardized coefficient, ΔR^2 = R Square change, ΔF = F change, Δdfs = Degrees of freedom. * $p < .05$; ** $p < .01$; *** $p < .001$.

vegetarian meals and attitudes toward fish meals were linked with policy support, but the relationship was positive for vegetarian meals and negative for fish meals. Teachers' meat attachment and environmental awareness levels also showed significant negative associations with policy support.

As for the meal trait specific analyses (Table 3), participants showed higher support for policies promoting plant-based eating in their schools when they considered meat meals healthy, and lower support when they considered meat meals sustainable. Support was also negatively associated with considering fish meals sustainable, and positively associated with considering fish meals easy to prepare. As for vegetarian meals, higher levels of support were linked with liking vegetarian meals and considering these meals healthy.

3.3. Parents' sample

No collinearity problems were detected (VIF values ranged from 1.02 to 3.59; tolerance ranged from 0.28 to 0.99). Table 4 presents the results. In the first model, referring to the sociodemographic variables, the older the participants were, the greater their support for policies promoting plant-based eating in their schools. In addition, policy support tended to decrease as the percentage of household income spent on food increased. The second model, referring to capability variables, did not add explanatory capacity to the model. In the third model, which targeted opportunity variables, injunctive norms showed a positive and significant association with policy support. Finally, the fourth model, focusing on motivation variables, did not add explanatory capacity to the analyses.

As for the meal trait specific analyses (Table 5), the only significant predictor of support for policies promoting plant-based eating in their children's schools was the perception that vegetarian dishes were more expensive.

4. Discussion

Dietary shifts from meat-centric to healthy and well-planned plant-

Table 3
Teachers' meal trait-specific correlates of support for policies promoting plant-based eating in their schools.

	Estimate	SE	95% CI	
			LB	UB
Constant	3.346***	0.410	2.537	4.155
<i>Meat meals</i>				
Dislike vs. like	-.041	.044	-.129	.046
Unhealthy vs. healthy	.144*	.061	.025	0.264
Unnatural vs. natural	.076	.059	-.040	.192
Unsustainable vs. sustainable	-.113*	.051	-.214	-.011
Difficult to prepare vs. easy to prepare	.012	.047	-.080	.103
Cheap vs. Expensive	-.043	.053	-.146	.061
<i>Fish meals</i>				
Dislike vs. like	-.040	.046	-.132	.051
Unhealthy vs. healthy	.050	.069	-.085	.185
Unnatural vs. natural	-.076	.060	-.195	.042
Unsustainable vs. sustainable	-.178**	.056	-.289	-.068
Difficult to prepare vs. easy to prepare	.106*	.047	.013	.199
Cheap vs. expensive	.047	.048	-.047	.141
<i>Vegetarian meals</i>				
Dislike vs. like	.115**	.038	.041	.189
Unhealthy vs. healthy	.128*	.060	.010	.246
Unnatural vs. natural	.023	.062	-.100	.146
Unsustainable vs. sustainable	-.005	.056	-.115	.105
Difficult to prepare vs. easy to prepare	-.009	.040	-.088	.070
Cheap vs. expensive	-.007	.042	-.090	.076

Notes: SE=Standard Error, LB = Lower Bound, UB=Upper Bound. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 4
Parents' correlates of support for policies promoting plant-based eating in their children's schools.

Variables	β	ΔR^2	ΔF	Δdfs
<i>Sociodemographic variables</i>				
		.205	3.756**	5, 73
Respondent's gender	-.075			
Respondent's age	.296*			
Students' gender	-.181			
Students' age	-.243			
Household income spent on food	-.232*			
<i>Capability</i>				
		.015	.675	2, 71
Perceived knowledge about sustainable food consumption	.131			
Perceived access to information about sustainable food consumption	-.020			
<i>Opportunity</i>				
		.139	2.350*	6, 65
<i>Social Norms</i>				
Descriptive norm	-.107			
Injunctive norm	.378**			
Dynamic norm	.102			
<i>Social Representations</i>				
Warmth	.268			
Competence	-.150			
Vitality	-.135			
<i>Motivation</i>				
		.031	.499	6, 59
<i>General perceptions about meals</i>				
Meat meals	-.047			
Fish meals	-.074			
Vegetarian meals	.058			
Meat attachment (dependence)	-.032			
Health awareness	0.051			
Environmental awareness	-.0163			

Notes: β = Standardized coefficient, ΔR^2 = R Square change, ΔF = F change, Δdfs = Degrees of freedom. * $p < .05$; ** $p < .01$; *** $p < .001$.

rich diets are required to mitigate the environmental impact of our current food systems (Poore & Nemecek, 2018; Shepon et al., 2018; Springmann et al., 2018; Willett et al., 2019). Due to their scale and reach, school meals can be expected to help enable and accelerate these shifts. The current study explored which variables under three domains (capability, opportunity, motivation) were linked with parents' and teachers' support for measures promoting plant-based eating in their schools. Overall, teachers seemed to be slightly more favorable to such measures and displayed more favorable (injunctive and dynamic) norms toward plant-based eating, more negative appraisals of meals with meat (i.e., perceived healthiness, naturalness, and sustainability), and lower attachment to meat consumption. In addition, the results showed that variables under the opportunity domain significantly predicted parents' and teachers' policy support. Motivation variables appeared to be relevant in the teachers' sample. Variables under the capability domain showed no meaningful associations with parents' or teachers' policy support.

More specifically, perceiving favorable prescriptive norms about plant-based eating in schools was consistently linked with support for measures promoting increased plant-based eating in schools. Prescriptive norms (also called injunctive norms, Cialdini et al., 1990) indicate what is perceived as acceptable and what is considered right and wrong from a societal point of view (Corr eg e et al., 2017). The effectiveness of prescriptive norms derives from providing individuals with a signal

Table 5

Parents' meal trait-specific correlates of support for policies promoting plant-based eating in their schools.

	Estimate	SE	95% CI	
			LB	UB
Constant	3.919***	0.598	2.724	5.114
<i>Meat meals</i>				
Dislike vs. like	-.123	.092	-.307	.062
Unhealthy vs. healthy	.046	.121	-.195	.288
Unnatural vs. natural	-.077	.113	-.302	.149
Unsustainable vs. sustainable	-.095	.088	-.269	.080
Difficult to prepare vs. easy to prepare	.043	.080	-.117	.203
Cheap vs. expensive	-.173	.093	-.359	.014
<i>Fish meals</i>				
Dislike vs. like	-.089	.093	-.275	.097
Unhealthy vs. healthy	-.031	.115	-.261	.200
Unnatural vs. natural	-.054	.104	-.262	.154
Unsustainable vs. sustainable	-.095	.095	-.095	.284
Difficult to prepare vs. easy to prepare	.082	.082	-.082	.245
Cheap vs. expensive	.021	.098	-.175	.217
<i>Vegetarian meals</i>				
Dislike vs. like	.069	.074	-.079	.216
Unhealthy vs. healthy	.163	.115	-.067	.393
Unnatural vs. natural	-.112	.126	-.363	.139
Unsustainable vs. sustainable	.101	.104	-.108	.310
Difficult to prepare vs. easy to prepare	-.104	.081	-.265	.058
Cheap vs. expensive	.168*	.079	.011	.326

Notes: SE=Standard Error, LB = Lower Bound, UB=Upper Bound. * $p < .05$; *** $p < .001$.

about the potential approval or disapproval of a given target behavior, allowing people to adjust their actions and expectations accordingly (Farrow et al., 2017).

Teachers' favorable appraisals of plant-based meals (i.e., hedonic value, perceived healthiness) were linked with support for school-based policies to promote increased plant-based eating, whereas higher meat attachment and perceiving meals with meat and fish as more sustainable were linked with lower levels of support. These findings are consistent with previous research showing that motivation and consumption variables (e.g., meat attachment; eating habits) can hinder or enable transitions from meat-centric to more plant-based diets (Dowsett et al., 2018; Graça et al., 2015; MacDiarmid et al., 2016; Rosenfeld, 2018; Zur & Klöckner, 2014). These results also suggest that lower support for plant-based eating in schools may be linked with specific beliefs regarding fish meals as being sustainable, perhaps in comparison to meals with meat (i.e., favoring fish instead of plant-based meals as more sustainable alternatives to meals with meat).

Regarding parents, the only meal attribute showing meaningful associations with support for policies promoting plant-based eating in their children's schools was the perception that plant-based meals were more costly. These results suggest that parents may associate a higher cost for meal providers with an increased value and quality of plant-based meals in the school context. Hence, parents may be more supportive of policies that provide free or low-cost access to higher-quality meals that they perceive as valuable but are typically less accessible to their children. Previous research in catering and hospitality has indeed shown that price can influence consumers' perception of service quality and satisfaction (e.g., Ryu & Han, 2010; Zhong & Moon, 2020). Contrary to our expectation, other motivational variables were not found to add unique explanatory value to the models with the sample of parents. This suggests that the social opportunity variables may have overshadowed motivational variables in our sample of parents with children studying in public schools.

4.1. Limitations and future directions

Notwithstanding the novelty of this study and the relevance of the topic, the current findings should be seen as preliminary due to the characteristics of our sample (i.e., small, convenience, non-representative, risk for self-selection biases), as well as the lack of previous research on support for plant-forward food policies in schools with which we could compare our results. In addition, all measurement instruments were conceptually grounded in the framework that guided this work, which provides a theoretically meaningful contribution, but some were developed ad-hoc for the study (e.g., health and environmental concerns, norms, perceived knowledge about sustainable food consumption), which compromises their validity. Shortcomings related to the sample and measurement instruments may have accounted for some seemingly inconsistent and counterintuitive results for which we could not find plausible explanations, namely policy support in the teachers' sample showing negative associations with our measure of environmental concern and positive associations with perceived healthiness of meals with meat. Further research with more robust sampling procedures in diverse cultural backgrounds is necessary to strengthen confidence in the current findings, and ultimately inform policy and interventions in school contexts. Another limitation of this study is that it did not account for the views school-aged children and adolescents have on this subject. Our initial vision was to have students, parents, teachers, and school directors represented in the study, but we had to adjust our scope based on material and logistical considerations. Nevertheless, we suggest that all relevant stakeholders – including school-aged children and adolescents – should participate in research and discussions on how to promote sustainable food transitions in schools, not only from a rights perspective (i.e., the right to participate in matters that affect them directly) but also for the opportunities to raise awareness and foster engagement. Future studies should also seek to extend the range of variables and valid measurement instruments to assess barriers and enablers of policies that promote increased plant-based eating in schools, preferably using longitudinal and mixed-method (i.e., quantitative and qualitative) designs to gain further insight into the predictors of and discourses about such policies.

Another direction for future research is to bridge our findings with the emerging developments on how public perceptions of food-related issues may influence and be influenced by advocacy and public policy (Cullerton et al., 2016, 2018, de Boer & Aiking, 2021b; Miller et al., 2019; Reynolds et al., 2018). The current results indicate that social and motivation variables relevant to plant-forward transitions, such as social norms and perceived meal attributes, are linked with parents' and teachers' support for school-based measures to promote increased plant-based eating. Future studies could investigate whether these variables are also relevant for concrete actions that parents and teachers might take to enable sustainable food transitions in schools – such as working with parent- and teacher-associations to request changes in school food procurement processes, monitoring adherence to national school food guidelines in canteens and cafeterias, or encouraging students to favor certain foods (e.g., soup, vegetables, pulses) to increase their familiarity with those foods.

5. Conclusions

This study explored parents' and teachers' support for measures promoting plant-based eating in schools vis-à-vis potentially relevant variables under three domains for plant-forward transitions (Capability, opportunity, and motivation). Social opportunity (i.e., injunctive norm) showed associations with support for measures promoting plant-based eating in schools, both among teachers and parents. Variables in the motivation domain (e.g., positive perceptions of plant-based meals; lower meat attachment) also showed relevant associations with our outcome variable in the teachers' sample. Overall, these findings suggest that future research on how to enable less meat-centric and more

flexitarian food practices in schools should consider social and motivation variables relevant to plant-forward transitions. We also propose that future research extending the range of potential enablers and barriers of support for plant-based eating in schools with diverse groups in the school meals system may help understand which factors shape support for pro-environmental school food policies, and how to communicate and increase support for these policies.

Ethics statement

The study was approved by the ethical review board of the Institute of Social Sciences of the University of Lisbon.

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Author statement

LR: Conceptualization, Methodology, Writing - Original Draft, Writing - Reviewing and Editing. **LC:** Conceptualization, Methodology, Formal analysis, Investigation, Writing - Original Draft, Writing - Reviewing and Editing. **DG:** Conceptualization, Methodology, Writing - Reviewing and Editing. **CG:** Conceptualization, Methodology, Writing - Reviewing and Editing. **MT:** Conceptualization, Methodology, Writing - Reviewing and Editing. **JG:** Conceptualization, Methodology, Formal analysis, Investigation, Writing - Original Draft, Writing - Reviewing and Editing, Supervision, Funding acquisition.

Data statement

The research team did not receive permission to store the data on a public repository but can share the data upon request. The corresponding author has full access to the data reported in the manuscript.

Declarations of competing interest

The authors declare no conflict of interest.

Data availability

Data will be made available on request.

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