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When Environmental Motivation Does and Does Not Cut Emissions

Environmental Motivation and Students' Cafeteria Food Decisions

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Abstract

While environmental motivation is an acknowledged predictor of sustainable behavior, its relation to individuals' greenhouse gas emissions seems much weaker. We argue that one explanation for this seeming paradox is that (I) sustainable choices do not necessarily entail substantially lower emissions, and (II) individuals might not always act upon, or (III) correctly judge, emission differences between sustainable and non-sustainable behaviors. Data on the cafeteria meal choices and related emissions of N = 115 students were collected through on-site and online recruitment. A series of regression models revealed that environmental motivation was strongly related to sustainable (vegan or vegetarian) meal choices. Emission differences between available sustainable and non-sustainable (omnivorous) meals and food-related emission knowledge did not affect participants' choices. Yet, emission differences between available sustainable and non-sustainable options strongly moderated the effect of environmental motivation on emissions. Essentially, while environmental motivation seems to consistently predict sustainable meal choices, environmental motivation's emission-reduction potential is context-dependent. This implies that relating motivation with emissions needs to account for the context to provide a fair assessment of the emission-effect of environmental motivation.

Keywords

Environmental motivation, sustainable food consumption, greenhouse gas emissions, carbon footprint, motivation-impact gap.

Impact statement

We studied 115 university students' cafeteria meal choices for one week and found that while environmentally motivated students consistently chose sustainable (i.e., vegetarian or vegan) meals, these choices did not always result in meaningfully lower CO_2-equivalent emissions. On some days, motivated students chose a sustainable meal, but thereby emitted only slightly less or even more than those choosing the omnivorous alternative. For practitioners, this means that behavioral interventions promoting sustainable food choices, such as subsidies, nudges, or pricing adjustments, are not sufficient on their own. The actual emissions of the menu need to be adjusted, too. Cafeteria operators and policy makers should therefore ensure that promoted sustainable options are genuinely lower in emissions. Providing concrete emission information at the point of purchase may additionally help people identify the lowest-emission option within their dietary preferences.

1 Introduction

1.1 General introduction

Psychological research has identified many individual-level determinants of sustainable behavior—behavior aimed at reducing negative environmental consequences (e.g., Lo Dato et al., 2024; Neves et al., 2025). Yet, despite notable advances in explaining such behaviors, attempts to connect psychological variables with individuals' greenhouse gas (hereafter CO_2-equivalent, CO_2e) emissions have produced far less compelling results. Research shows that psychological determinants of sustainable behavior only share a limited overlap with people's aggregated CO_2e emissions—that is, CO_2e emissions accumulated over time and occasions (Bosshard et al., 2024; Nielsen et al., 2022). Most of these psychological determinants are tied to an individual's *motivation* to engage in sustainable behavior. Hence, these results raise concerns about motivation's relevance to CO_2e emissions. This is particularly concerning in the food domain, which accounts for roughly one-quarter of the world's CO_2e emissions (Poore & Nemecek, 2018).

In this study, we identify three requirements for a strong association between (psychological) motivational variables and individuals' CO_2e emissions to be observable. Importantly, these requirements concern individual behaviors and their respective CO_2e emissions. Over time, these individual behaviors translate into aggregated CO_2e emissions (i.e., individuals' CO_2e emissions).

First, it is necessary that sustainable behavior results in substantially lower CO_2e emissions than non-sustainable behavior. In other words, there should be a sizable objective difference in CO_2e emissions between sustainable and unsustainable behavior options. This requirement is critical because only in instances where it holds can psychological determinants of sustainable behavior be expected to translate into sizeable CO_2e emission reductions. Second, for the correlation between environmental motivation and CO_2e emissions to be strong, what individuals regard as the most sustainable option must also align with what objectively produces the lowest CO_2e emissions. That is, that CO_2e emissions are the environmental consequence that (in contrast to e.g., water footprint, animal welfare concerns, soil degradation, eutrophication potential) render behavioral options as (un)sustainable from the perspective of the individuals. Third, in this regard, it is also necessary that individuals are cognitively able to assess the relative CO_2e emissions of different behavior options.

In this study, we investigate whether these requirements are met. Through this exploration, we argue, the seeming inconsistency between individuals' environmental motivation and their CO_2e emissions becomes more explainable, allowing for a more precise understanding of when motivation can be expected to translate into measurable CO_2e emission reductions. A refined understanding is important to future intervention design, aiming to cut emissions, but also to aid a more nuanced interpretation of effect sizes resulting from motivation-emissions relations.

To support our argument, we use students' meal choices in a university cafeteria as our empirical example. Specifically, we examine the relation of students' environmental motivation—their personal commitment to environmental protection

(Kaiser et al., 2010; Neef et al., 2024)—with both meal choices and associated CO_2e emissions. We demonstrate how the differences in CO_2e emissions between sustainable (defined as vegan or vegetarian) and unsustainable (defined as omnivorous) meal options are largely irrelevant for people's actual choices but moderate the effect of environmental motivation on CO_2e emissions. In the following, we outline our theoretical considerations in detail.

1.2 Environmental motivation and sustainable meal choices

Scores of psychological determinants of sustainable choices in the food domain have been recognized in the literature, such as social norms, biospheric values, price consciousness, environmental attitude, or perceived behavioral control (Lo Dato et al., 2024). For this study, however, we rely solely on environmental motivation as our psychological determinant of sustainable behavior. As such, environmental motivation is among the best-validated and robust predictors of sustainable behavior (Lange & Dewitte, 2019), for food choices (Peri et al., 2025) and other sustainable behaviors (e.g., Taube et al., 2018). Accordingly, we formulate the following hypothesis.

> **H1**: Higher levels of environmental motivation predict sustainable meal choices.

1.3 CO_2e emission differences and sustainable meal choices

Sustainable behavior often reduces negative environmental consequences, including CO_2e emissions (Kaiser et al., 2003). Yet, what defines a behavior as sustainable from the viewpoint of individuals may not be driven solely by its CO_2e emissions, as a behavior has many more properties that potentially can render it sustainable (e.g., water depletion, effects on animal welfare; Neef et al., 2026), and different individuals might focus more on one or the other consequence(s). The reasons why people are vegetarians are manifold and include emission-related concerns (Timmons et al., 2024). However, animal welfare concerns are often the most frequently named reasons (Boyle, 2011), especially in Germany (where this study was conducted; Peri et al., 2025). Thus, CO_2e emissions of chosen (food) behaviors may often not, by default, be the most salient environmental attribute of food that environmentally motivated people care about when choosing what to eat.

Furthermore, even when the primary aim of individuals was to lower their CO_2e emissions, they would need to be able to estimate them accurately. Research raises reasonable doubts that individuals can accurately estimate the relative impact of different behavioral options or, specifically, food items (Cadario et al., 2025; Camilleri et al., 2019; Wynes et al., 2020). In this regard, Cadario et al. (2025) highlight the existence of a sizeable knowledge gap. Individuals may know, in broad strokes, that vegetarian diets generally emit less than omnivorous diets and act accordingly (see Hartmann et al., 2021). Generally, refraining from animal products can be a valid heuristic when a person is concerned about CO_2e emissions, because animal products often produce more CO_2e emissions than non-animal products (Poore & Nemecek, 2018). Yet, correctly judging the amount of CO_2e emissions for composite food items, such as prepared cafeteria meals, remains highly difficult. This is because a person would not only need to know the CO_2e emissions associated with each ingredient, but also the relative quantities in which a meal's ingredients are used (i.e., how many grams of each ingredient are included).

We assume that, by themselves and without additional information, environmentally motivated individuals may consistently select what they perceive as the most sustainable option and adhere to broader categories, such as choosing vegetarian or vegan meals, without necessarily being guided by or even being fully aware of the CO_2e emissions of their choices. For example, it is unlikely that a vegetarian would choose a low-emitting omnivorous meal simply because it emits less, since it still contains animal products—and that person would typically not be aware of the exact relative emissions.

Accordingly, the objective CO_2e emission differences between available meal options should, by and large, have no additional effect on sustainable meal choices beyond a person's environmental motivation. Likewise, even if it exists, broad food-related emission knowledge should have no effect beyond environmental motivation. We formulate the following hypothesis.[1]

> **H2a**: CO_2e emission differences between available meal options are largely unrelated to people's sustainable meal choices.
>
> **H2b**: Food-related emission knowledge is largely unrelated to people's sustainable meal choices.

1.4 Environmental motivation, CO_2e differences, and CO_2e emissions of meal choices

Environmental motivation is not directly connected to a person's CO_2e emissions or environmental consequences in general (Henn et al., 2019), but functions as a driver of sustainable behavior (see section 1.2; Kaiser et al., 2010). CO_2e emissions are a property of the chosen behavior (see Lange, 2024). In this sense, CO_2e emissions are (fully) mediated via the implemented behavior. Unfortunately, even sustainable meal choices do not necessarily guarantee substantially lower CO_2e emissions, as there exists a large variability in CO_2e emissions even within vegetarian and vegan food choices. For example, vegetarian meals containing dairy may sometimes emit more than omnivorous meals with less emission-intensive meats (see Ritchie, 2020). Thus, even if environmental motivation reliably predicts sustainable meal choices, it can only be associated with substantially reduced CO_2e emissions if there is a sizable difference in CO_2e emissions between sustainable and omnivorous meal options. This is particularly relevant in choice-restrictive contexts such as university cafeterias, where individuals' options are limited to the meals offered, and meals cannot easily be customized.

[1] Please note that H2a and H2b reflect our theoretical expectation that positive statistical associations of (a) CO_2e emission differences and (b) food-related emission knowledge with sustainable meal choice are weak and negligible. However, our data are not suitable for converting these hypotheses into testable hypotheses under the null hypothesis significance testing framework (e.g., through equivalence tests). Accordingly, H2a/b are assessed in terms of whether the data provide evidence that contradicts this expectation. Specifically, positive effect estimates that are reliably and significantly different from zero and of non-trivial magnitude would be strong contradictions.

Yet, if environmental motivation predicts sustainable meal choices (see H1), it should also predict lower CO_2e emissions, since, on average, vegetarian and vegan meals are less emission-intensive than omnivorous meals (Poore & Nemecek, 2018). However, the magnitude of this effect should increase with increasing CO_2e emission difference between sustainable and omnivorous meals. Accordingly, we formulate the following two hypotheses.

> **H3**: Higher levels of environmental motivation reduce the CO_2e emissions of meal choices.
>
> **H4**: The relationship between environmental motivation and CO_2e emissions of meal choices is moderated by the CO_2e emission differences of the available sustainable and omnivorous alternatives.

2 Methods

2.1 Ethical considerations and data availability

This study was ethically approved by the German Association for Experimental Economic Research e.V. (No. 9VACYB8q). All participants gave their informed consent to participate in the study and to the publication of their data. Permission was also obtained from the Studierendenwerk Freiburg-Schwarzwald, the company operating the university cafeteria, to directly distribute the survey outside of their premises.

Statistical analyses were carried out in RStudio (version 2024.12.1+563; Posit Team, 2025). R-packages are cited in the Supplementary Material. R code and data are publicly available to download at: https://doi.org/10.17605/OSF.IO/CV3G7 (Neef et al., 2025).

2.2 Sample and exclusion criteria

Participants were invited to fill out the study's online survey via email through the University of Freiburg's mailing list and via direct distribution of a QR-code link in front of the university's main cafeteria. Participant sampling was conducted over the course of three days in January 2024, specifically Friday, 26th January to Sunday, 28th January 2024 (Friday and Saturday via QR-code distribution and Friday to Sunday via mailing list). Participation was only possible during these three days and was incentivized via the chance to win a 25 € cafeteria gift card. Participants were encouraged to complete the survey on an individual basis and avoid collectively answering in groups.

The sample size was determined by the number of individuals who, on the chosen data collection dates, agreed to fill out the survey. The survey was completed by 248 out of 322 participants who started the survey (77% completion rate). The study required participants to be students at the University of Freiburg. We excluded non-students from the analyses because they are subject to different pricing schemes, and we sought to ensure comparable conditions across participants. Moreover, it was required that participants have purchased at least two meals at the university cafeteria across the study period to guarantee a comparable baseline of cafeteria use across participants. Thus, of the 248 completed surveys, n = 12 participants were excluded for not being students, and *n* = 56 participants were excluded for not having purchased at least two meals. Further, *n* = 16 participants were excluded due to an overall item non-response rate of greater than 20%. In addition, participants were excluded for incorrectly answering the one instructed item response question (*n* = 8), and *n* = 40 participants self-excluded, indicating they did not fill out the survey with care or did not answer that question. Finally, *n* = 1 participant was later excluded for being flagged as an influential outlier.

The final sample consisted of *N* = 115 participants (*M* = 22.5, *SD* = 3.5; 62.6% female, 36.5% male, 0.9% diverse; 65.2% high school degree, 26.1% bachelor's degree, 8.0% master's degree; *n* = 26 self-categorized as omnivore, *n* = 63 as vegetarian, and *n* = 26 as vegan).

2.3 Measures

The measures of the survey are described below. The online survey was implemented in SoSci Survey (Leiner, 2024). The full survey can be found in the Supplementary Material (Table S1).

2.3.1 Environmental motivation

Environmental motivation was measured using the General Ecological Behavior (GEB) scale (Kaiser, 2020). The GEB is a widely adopted and well-validated scale for assessing environmental motivation (e.g., Lange, 2023; Saile et al., 2025). Importantly, it takes into account the cost of behaviors when estimating a person's environmental motivation by applying the Rasch model (Rasch, 1960). This scale includes 32 polytomous (5-point scale; 1 = "Never", 2 = "Seldom", 3 = "Occasionally", 4 = "Often", 5 = "Very often") and 17 dichotomous (1 = "Yes", 2 = "No") items, capturing the self-reported frequency of sustainable behaviors in the former and their mere occurrence in the latter. Note, we omitted the item assessing whether participants are vegetarians, as this could otherwise introduce circularity in explaining meal choices. Thanks to the indicator independence property of the Rasch model, omitting one item does not deter the measurement (Kaiser et al., 2018).

The polytomous items were dichotomized for Rasch model estimation, as is the common approach when using the GEB (e.g., Peri et al., 2025; Saile et al., 2025). Responses between 1 and 3 were recoded as 0 (i.e., no sustainable behavior), and responses between 4 and 5 were recoded as 1 (i.e., sustainable behavior). The reliability of the environmental motivation estimation was *r* = .78 (here referring to how well the GEB can differentiate the participants in their environmental motivation). Please refer to Supplementary Material (Tables S2 and S3) for more detailed calibration results and item estimates.

2.3.2 Food-related emission knowledge

Food-related emission knowledge was measured with a ranking task of eight food consumption behaviors, an approach adapted from Cologna et al. (2022). The items represented food-related behaviors with low (e.g., "eat only bio/organic foods"), moderate (e.g., "reduce avoidable food waste"), and high (e.g., "shift to a vegan diet [from an omnivorous diet]") CO_2e mitigation potential (see Wynes & Nicholas, 2017 for benchmarks). The mitigation potential was based on life cycle assessments from Germany (the place of this study), where possible (Meier & Christen, 2013; Treu et al., 2017), and otherwise from European estimates (Ivanova et al., 2020). Participants ranked the behaviors from 1 ("most effective") to 8 ("least effective") in terms of reducing CO_2e emissions (e.g., "eat only regional/local foods" or "eat a vegetarian diet"). See Supplementary Table S4 for all eight food-related behaviors rated by the participants.

Food-related emission knowledge scores were calculated using Spearman's rank correlation (Spearman, 1904) between participants' rankings and the actual CO_2e emissions mitigation potential. Potential scores range from r = -1.0 (completely incorrect ranking) to r = 1.0 (perfect ranking). In this sample, the mean score was r = .60, indicating that participants were somewhat able to distinguish more and less effective behaviors on a broad level. Individuals' food-related emission knowledge was Fisher-z-transformed before calculating the mean (Fisher, 1992). These z-transformed values were also used in all subsequent analyses (see sections 2.4.1 and 2.4.2). The correlation between individuals' food-related emission knowledge and environmental motivation was r = .24, 95% CI [.06, .40], p = .011.

2.3.3 Sustainable meal choices

The survey included one item for each day (Monday to Friday), which asked participants to recall whether they had eaten in the cafeteria that day and, if so, which exact meal they had chosen (e.g., soy gyros with tzatziki, vegetable rice, and carrot coleslaw). Since the survey was administered from Friday to Sunday, all participants had the chance to have eaten at the cafeteria on all days. On average, each participant ate 3.46 meals (SD = 1.02) in the study period. For this research, we defined all non-omnivorous meal choices (i.e., vegan and vegetarian) as sustainable meal choices. Participants who self-classified as omnivores ate sustainable meals 49% of the time.

In Table 1, we present the available vegan, vegetarian, and omnivorous meal choices, the mean price for vegan, vegetarian, and omnivorous meals per day, the mean price difference between sustainable and omnivorous meals, and the number of meals chosen per category in total. The exact meals that were available can be found in the Supplementary Material (Table S1).

Table 1

Available meals per day and total meals chosen per category

Day	Omnivorous (M_{price})	Vegetarian (M_{price})	Vegan (M_{price})	M_{price} diff. sus. vs. om. (€)*
Monday	2 (4.08 €)	2 (3.70 €)	3 (3.42 €)	-0.55
Tuesday	2 (4.08 €)	2 (3.70 €)	3 (4.42 €)	0.05
Wednesday	2 (4.08 €)	2 (3.70 €)	2 (3.38 €)	-0.54
Thursday	1 (4.25 €)	4 (3.45 €)	2 (3.38 €)	-0.82
Friday	2 (4.08 €)	1 (2.50 €)	3 (3.90 €)	-0.53
Total meals chosen	51	195	152	

Note. *Mean price difference between sustainable and omnivorous meals. The price differences were calculated before rounding. For every day but Tuesday, the sustainable meals were on average cheaper than the omnivorous meals.

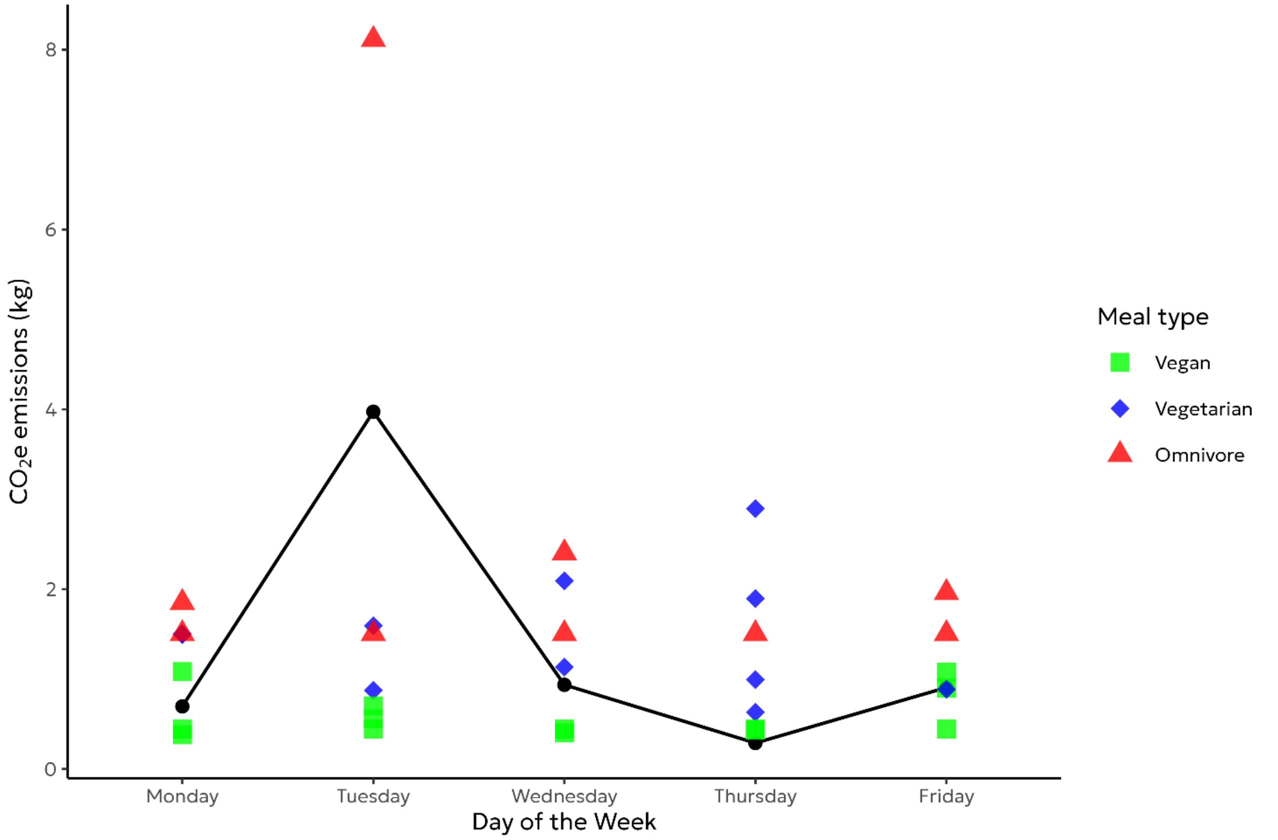
2.3.4 CO_2e emissions of meals and differences in available meal options

A detailed ingredient list on meals served at the university cafeteria during the study period (January 22nd to January 26th, 2024) was obtained from the cafeteria operator. The CO_2e emissions of meals were calculated using the Cool Food Calculator (Waite et al., 2019). For more information, please refer to the Supplementary Material.

We calculated the mean CO_2e emission differences between the omnivorous and sustainable (i.e., vegan and vegetarian) meal options by subtracting the mean CO_2e emissions of sustainable meal options from the mean CO_2e emissions of omnivorous meal options. The mean difference between sustainable options and omnivorous options was the largest on Tuesday, while it was marginal on Thursday. More specifically, while vegan meals were consistently the lowest-emitting option, the relative ranking of vegetarian and omnivorous meals fluctuated, with one occasionally exceeding the other (see Figure 1). This variation in CO_2e emission differences illustrates that the first requirement—that sustainable options entail substantially lower CO_2e emissions (see Introduction)—does not consistently hold. Essentially, this implies that sustainable meal choices (regardless of environmental motivation) do not have the same CO_2e emission reduction potential every day. While it was sometimes large, on other occasions, it was much smaller.

Figure 1

Mean difference and exact CO_2e emissions of sustainable and omnivorous meal options each day



Note. The solid black line depicts the mean CO_2e differences between sustainable and omnivorous meals served every day. Higher values on the y-axis correspond to larger differences in favor of the sustainable meals. The green squares depict the CO_2e emissions of the available vegan options. The blue diamonds depict the CO_2e emissions of the available vegetarian options. Finally, the red triangles show the CO_2e emissions of the available omnivorous options.

2.4 Analysis approach

2.4.1 Analysis approach: H1 and H2a/b

To test whether environmental motivation positively predicted and whether objective CO_2e emissions related to sustainable meal choices, we analyzed daily meal choices with four logistic mixed-effects regression models. The binary outcome was coded 1 = *sustainable* (vegetarian or vegan) and 0 = *omnivorous*. In Model 1, environmental motivation was entered as the sole continuous predictor. In Model 2, the mean CO_2e emission differences of meals and environmental motivation were entered as predictors. In Model 3, environmental motivation and food-related emission knowledge were entered as predictors. In Model 4, we also added sociodemographic variables (age, gender, and education) and the mean price differences between sustainable and omnivorous meals as control variables. To account for repeated observations within individuals (several meal choices across the week for each participant), we added a random intercept for participants in all models. Note, although the data are also clustered within weekdays, we did not include a random intercept for weekdays. With data from five weekdays, the day-level fixed effects (CO_2e emission difference [models 1-4], price difference

Environmental Psychology Open

[model 4]) already accounted for most of the available day-level variance, leaving little for a random intercept to capture. Consistent with this, a sensitivity check including a random intercept for weekdays yielded virtually identical results and worse model fit (i.e., higher AIC and BIC). All continuous predictors were standardized and centered (M = 0; SD = 1). For the zero-order correlations of the person-level variables, see Supplementary Material (Table S5). For detailed model assumption checks, see Supplementary Material (Figures S6-9).

2.4.2 Analysis approach: H3 and H4

To provide evidence that the observable influence of environmental motivation on CO_2e emissions depends on the CO_2e emission difference of the available meal choices, we fitted three generalized linear mixed-effects models (GLMM) with a Gamma distribution and log link to the CO_2e emissions of each meal choice. The Gamma distribution is commonly used for continuous outcome variables that are strictly positive and have a positive skew. In the present case, the CO_2e emissions cannot take non-positive values (i.e., they must be > 0) and tend to show a long right tail, which is why we chose the Gamma distribution. The log link allows model coefficients to be interpreted as percentage changes in expected CO_2e emissions upon exponentiation.

In Model 5, we entered environmental motivation as the sole continuous predictor. In Model 6, we added the CO_2e emission differences and their interaction as predictors. In Model 7, we additionally added sociodemographic variables (age, gender, and education), individuals' food-related emission knowledge, and the mean price differences between sustainable and omnivorous meals as control variables. Again, to account for repeated observations within individuals, we added a random intercept for participants (again, we did not include a random intercept for weekdays for the same reason as explained in section 2.4.1). All continuous predictors were standardized and centered. Effects are reported as percent change in expected CO_2e (kg) per 1-SD increase in the predictor(s) (for continuous predictors). For the zero-order correlations of the person-level variables, see Supplementary Material (Table S5). For detailed model assumption checks, see Supplementary Material (Figures S10-12).

2.5 Sensitivity analyses

We conducted three sensitivity analyses. First, we re-ran Models 1-7 on the sample reported in section 2.2, but we classified only vegan meal choices as "sustainable" while collapsing vegetarian and omnivorous meals into one category. Second, we re-ran Models 1-7 with less strict data exclusions with the original classification (i.e., vegan and vegetarian = sustainable vs. omnivorous). Third, we re-ran Models 1-7 with less strict data exclusion and with the alternative specification of "sustainable" (i.e., vegan = sustainable vs. vegetarian and omnivorous). The results did not alter our conclusions, but altered the magnitude of the effects. We report these analyses in the Supplementary Material, denoted as Sensitivity Analysis A-C.

3 Results

3.1 Results: H1 and H2

Table 2 presents detailed results regarding hypotheses H1 and H2a/b. Please note that odds ratios (OR) greater than 1 indicate an increased likelihood of choosing a sustainable meal, whereas ORs smaller than 1 indicate a decreased likelihood (OR = 1 means no association). Accordingly, if the 95% confidence intervals for ORs include 1, the significance level of an effect exceeds the threshold of $p = .05$.

As predicted, environmental motivation significantly increased the likelihood of choosing a sustainable meal. Specifically, in Model 1, a 1-*SD* increase in environmental motivation was associated with a 13-fold increase in the odds of selecting a sustainable meal. In Models 2 and 3, a 1-*SD* increase in environmental motivation was associated with a 14-fold (Model 2) and 9-fold (Model 3) increase. The effect remained significant with control variables (8-fold increase in Model 4). The mean CO_2e emission differences and food-related emission knowledge were unrelated to choosing a sustainable meal, as can be seen in Model 2-4.[2] Moreover, when looking at the R^2m (fixed effects), one can see that from Model 1 to Model 2 and 3, the R^2m does not increase (substantially). Taken together, the results support H1. With respect to H2a/b, we find no evidence that either the objective CO_2e emission differences between available meal options or food-related emission knowledge are positively associated with individuals' sustainable meal choices. Consistent with our footnote in section 1.3, these non-significant effects are interpreted as an absence of evidence for such associations, but not as significant evidence for the absence of such associations.

[2] Please note that we additionally tested whether food-related emission knowledge moderated the effect of CO_2e emission differences on meal choices, because, in theory, participants with such knowledge might understand when and when not choosing a sustainable meal matters for their emissions. This interaction was not statistically significant ($p = .960$), suggesting that knowledge did not differentially affect meal choices depending on the magnitude of the available emission differences in this sample.

Table 2

Results of logistic mixed-effects regressions predicting the likelihood of choosing a sustainable meal versus an omnivorous meal option

	Model 1		*Model 2*		*Model 3*		*Model 4*	
Variable	*OR* 95% CI []	*p*	*OR* 95% CI []	*p*	*OR* 95% CI []	*p*	*OR* 95% CI []	*p*
Intercept	321.7 [27.5, 3763]	<.001	373.3 [28.7, 4856.9]	<.001	117.2 [10.9, 1253]	<.001	480.6 [58.1, 3978]	<.001
EM	13.64 [3.12, 59.6]	<.001	14.12 [3.10, 64.2]	<.001	8.63 [2.03, 36.6]	.003	7.50 [2.63, 21.4]	<.001
$M_{CO_2e\ diff.}$			0.75 [0.45, 1.23]	.251			0.92 [0.34, 2.51]	.867
EK					5.06 [0.56, 46.2]	.150	1.54 [0.41, 5.80]	.519
$M_{price\ diff.}$							1.13 [0.41, 3.09]	.811
Age							0.64 [0.29, 1.39]	.256
Male							0.06 [0.01, 0.31]	<.001
Bachelor's degree							0.24 [0.04, 1.37]	.108
Master's degree							0.87 [0.06, 12.2]	.917
R^2c	.87		.87		.85		.79	
R^2m	.28		.27		.29		.53	

Note. CI = 95% confidence intervals. OR = Odds Ratio. EM = Environmental motivation. $M_{CO_2e\ diff.}$ = Mean CO_2e emission difference between sustainable and omnivorous meal alternatives. EK = Food-related emission knowledge. $M_{price\ diff.}$ = Mean price difference between sustainable and omnivorous alternatives. The reference category for the gender variable was female; the reference category for education was having at least a high-school diploma. R^2 values are pseudo R^2s calculated as recommended by Nakagawa and Schielzeth (2013). R^2c = R^2 conditional (including random effects). R^2m = R^2 marginal (fixed effects only).

3.2 Results: H3 and H4

The results for the hypotheses H3 and H4 are provided in Table 3 and Figure 2. Please note that the coefficients reported are changes in percent in expected CO_2e emissions per meal choice. Specifically, per *SD* increase in a predictor, the predicted emissions change by the respective value, while holding all other predictors constant. Accordingly, negative values indicate lower relative emissions, whereas positive values indicate higher relative emissions.

As predicted, environmental motivation significantly reduced CO_2e emissions regardless of the emission difference between sustainable and omnivorous meal options, supporting H3. Specifically, a 1-*SD* increase in environmental motivation was associated with 17.9% lower CO_2e emissions per meal choice (Model 5; 16.5%

in Model 6, and 14.3% in Model 7). However, the significant interaction term (supporting H4) indicated that, for a 1-*SD* increase in the CO_2e emissions difference between options, a 1-*SD* increase in environmental motivation was associated with an additional 14.1% reduction in CO_2e emissions in Model 6 and 13.8% in Model 7.

Table 3

Results of generalized mixed-effects regressions predicting the CO_2e emissions via environmental motivation and the CO_2e emissions difference between sustainable and omnivorous meal options

	Model 5		*Model 6*		*Model 7*	
Variable	% change 95% CI []	*p*	% change 95% CI []	*p*	% change 95% CI []	*p*
EM	-17.9 [-25.1, -10.0]	<.001	-16.5 [-16.8, -16.2]	<.001	-14.3 [-21.4, -6.5]	.001
$M_{CO_2e\ diff.}$			-5.5 [-5.8, -5.2]	<.001	-13.6 [-22.4, -3.9]	.007
EM × $M_{CO_2e\ diff.}$			-14.1 [-14.3, -13.8]	<.001	-13.8 [-17.5, -9.9]	<.001
EK					-0.7 [-8.4, 7.8]	.875
$M_{price\ diff.}$					-9.3 [-18.6, 0.9]	.073
Age					-3.4 [-12.6, 6.7]	.495
Male					32.3 [10.6, 58.2]	.002
Bachelor's degree					18.6 [-3.3, 45.5]	.102
Master's degree					27.7 [-11.8, 84.7]	.195
R^2c	.35		.40		.41	
R^2m	.09		.17		.24	

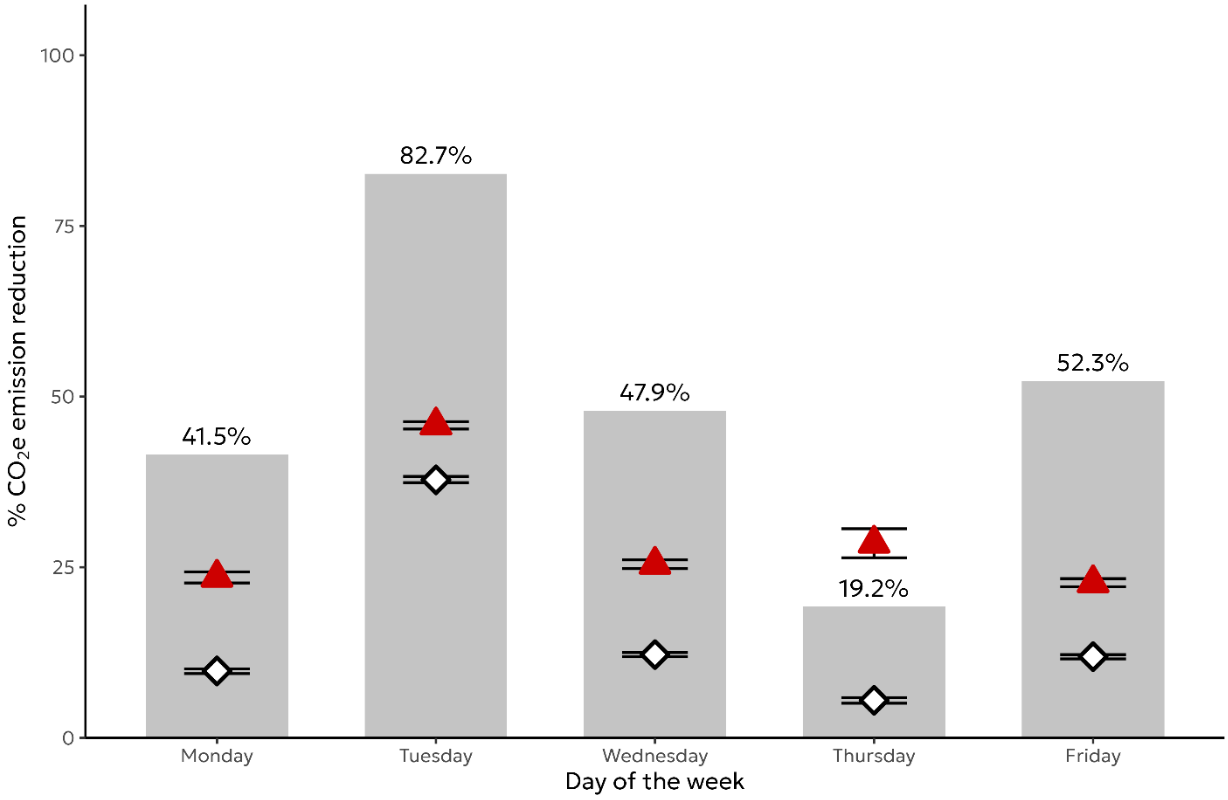
Note. *** = $p < .001$; ** = $p < .01$; * = $p < .05$; EM = Environmental motivation; $M_{CO_2e\ diff.}$ = Mean CO_2e emission difference between sustainable and omnivorous meal alternatives; EK = Food-related emission knowledge; $M_{price\ diff.}$ = Mean price difference between sustainable and omnivorous alternatives; the reference category for the gender variable was female; the reference category for education was having at least a high-school diploma; R^2 values are pseudo R^2s calculated as recommended by Nakagawa and Schielzeth (2013); R^2c = R^2 conditional (including random effects); R^2m = R^2 marginal (fixed effects only). The intercept is omitted because a percentage interpretation is not meaningful for the baseline in a Gamma model.

Note that because every meal emits CO_2e, total elimination of CO_2e emissions is not possible. Thus, the effects displayed in Table 3 (i.e., the CO_2e emission reduction effects) are best understood when contextualized with the menu constraints (i.e., the theoretically possible CO_2e reduction; see Figures 1 and 2). The colored bars in Figure 2 show the *achievable* percent saving each day (mean sustainable vs.

mean omnivorous), which varied widely across the week. The white diamonds depict the modeled percentage reduction from a 1-*SD* increase in environmental motivation, evaluated against each day's objective CO_2e emission difference (the moderator; we used Model 6). Hence, the diamonds illustrate the interaction between environmental motivation and the objective CO_2e emission difference. Expressed relative to the context, the modeled EM reduction corresponds on average to 29.2% of the achievable mean saving on a given day (range: 22.7 to 45.8%; see the red triangles in Figure 2). The contextualized percentages are consistently larger than the raw model-based percentages (i.e., red triangles vs. white diamonds).

Figure 2

Contextualized CO_2e emissions savings



Note. Grey bars indicate the achievable percentage CO_2e emission savings for each day (mean sustainable vs. mean omnivorous option); the percentage printed above each bar represents that day's achievable saving. The white diamonds depict the modeled percent reduction in expected CO_2e emissions associated with a 1-*SD* increase in environmental motivation, moderated by each day's objective CO_2e emission difference. The red triangles illustrate this modeled reduction expressed as a proportion of the achievable daily emission savings. In simple terms, the red triangles show how large the modeled reduction (white diamonds) is relative to what was achievable on that day (grey bars). Error bars represent 95% confidence intervals. All estimates are based on Model 6 and reflect population-level (i.e., fixed) effects.

4 Discussion

4.1 General discussion

Our findings add nuance to the understanding of how psychological determinants of sustainable behavior (here, environmental motivation predicting sustainable meal choices) relate to resulting CO_2e emissions. In line with this previous work (Nielsen et al., 2022), our results demonstrate that environmental motivation alone is not a guarantee of reduced CO_2e emissions. Although environmental motivation predicted sustainable meal choices reliably (H1; in line with Peri et al., 2025), its effect on CO_2e emissions was highly context-dependent (H3 and H4). We believe that we provide one possible explanation for why relations between individuals' environmental motivation and emissions are typically smaller than between motivation and behavior.

First, our day-level visualization of the available meals and their associated CO_2e emissions shows that sustainable options do not always entail substantially lower CO_2e emissions than non-sustainable (in this case omnivorous) meals (see Figure 1). Consequently, even steady sustainable choices cannot always imply the same CO_2e emissions reduction. This becomes evident in the varying effects of environmental motivation on CO_2e emissions in the models depicted in Table 3 (see the interaction terms). Beyond the significant interaction between environmental motivation and CO_2e emission differences in Table 3, Figure 2 illustrates this effect. Essentially, the same increase in environmental motivation yields different emission changes depending on what the menu makes feasible. Moreover, because every meal emits CO_2e, total elimination is impossible. Accordingly, model-based percent reductions can appear more modest in isolation. Yet, once benchmarked against what is possible, they represent a substantial share of what is feasible (see the red triangles in Figure 2). This is important since the magnitude of the effect of environmental motivation on CO_2e emissions may be less appreciated without such contextualization.

Speaking to the second and third requirements, we found no evidence that either the objective CO_2e emission difference between sustainable and omnivorous options, nor the food-related emission knowledge, predicted the likelihood of choosing a sustainable meal (H2a/b; Models 2–4; Table 2). Yet, this does not imply our participants were totally unaware of CO_2e emissions. In fact, participants showed some broad domain knowledge, which was also weakly positively correlated with environmental motivation (see section 2.3.2). However, such broad knowledge appears not to have guided individuals' meal choices above and beyond environmental motivation. Note, the non-significant coefficients are not, by themselves, affirmative evidence for the absence of an effect (Lakens, 2017). Nevertheless, this result is consistent with persistent evidence that individuals lack sufficient knowledge to assess CO_2e emissions correctly (Camilleri et al., 2019; Wynes et al., 2020) and do not consistently act solely based on knowledge in general (Laroche et al., 2002; Liu et al., 2020; Mundt et al., 2026). Several alternative explanations must be considered for our data. Besides the obvious small sample size, it must be mentioned that our measure of emission knowledge was not specifically tied to the available meals. It is possible that participants correctly judged the relative emissions of the available meal options and acted accordingly, but that this precise knowledge was not reflected in our broader knowledge measure. This could be an avenue for future research (see section 4.4). Other explanations for the non-significant findings include menu restrictions (i.e., participants could only choose between a limited set of alternatives each day, which might have influenced the effects) or even that participants incorrectly recalled their choices, which may have overwritten small knowledge effects.

4.2 Theoretical implications

Taken together, the requirements for a sizeable relation between environmental motivation and CO_2e emissions to be observable seem to be not always present. This matters because the motivation-emission relation is most often examined at higher levels of aggregation (e.g., accumulated clothing- or mobility-related CO_2e emissions, or overall personal carbon footprint; Bauske et al., 2022; Bosshard et al., 2024; Nielsen et al., 2022; Verfuerth et al., 2019), where emissions are combined across many behaviors. Especially at this level, the failure of the requirements to hold consistently makes it less realistic to expect environmental motivation (or other psychological variables) to translate into substantially lower CO_2e emissions. Specifically, this is because behaviors with heterogeneous CO_2e emission differences are combined, people define what is sustainable using criteria beyond CO_2e, and emission-related knowledge is limited. Consequently, weak motivation-emission overlap should be interpreted cautiously, as it might partially reflect aggregation noise rather than purely shortcomings of psychological variables alone. We further encourage researchers examining motivation-emission links to explicitly account for the available behavior choices, because the effect of psychological predictors on emissions is bounded by what is objectively achievable.

4.3 Practical implications

Furthermore, we want to highlight practical implications specific to the food domain. Generally, lowering the behavioral costs for sustainable meal choices would likely increase the probability of these choices. In this regard, subsidizing sustainable meal options or adjusting pricing structures to reflect CO_2e emissions of meals could help make sustainable choices more likely, not only through comparatively lower prices for sustainable options but also through norm effects (Hilton et al., 2014). For a comprehensive review of possible intervention studies, see Sato and Oldroyd (2025). However, as our data show, whether such interventions also come with a substantial CO_2e emissions decrease depends on the amount of CO_2e emissions the sustainable meal options save compared to non-sustainable options. Of course, lowering the CO_2e emissions of all available meals would naturally reduce CO_2e emissions. Poore and Nemecek (2018) show, animal-based food is often associated with higher CO_2e emissions than non-animal-based food. Accordingly, it seems more effective to increase the probability of vegetarian and vegan food choices while simultaneously assuring that these choices are associated with substantial CO_2e emission reduction.

Although we find no evidence that broad food-related emission knowledge is associated with choosing a sustainable meal option, prior research indicates that providing individuals with the concrete knowledge about a meal's CO_2e emission at the time of purchase (e.g., through labels) can help them select lower-emission alternatives (see e.g., Brunner et al., 2018). Vegetarians are unlikely to switch to an omnivorous meal, but they may nevertheless be willing to choose the "best-in-class" option within their dietary restrictions.

4.4 Strengths and limitations

The strength of this study lies in its calculation of the CO_2e emissions that the participants probably caused. Thereby, it provides a complementary view of the effects of environmental motivation on behavior and CO_2e emissions. Yet, as with any empirical study, several limitations should be noted. First, the sample consisted solely of university students and is quite small. This restricts the generalizability of the findings to broader populations and food contexts. Similarly, our data were collected across five specific cafeteria days with a limited number of meal options per day. Thus, unobserved characteristics of the available meals (e.g., meals with ingredients that are particularly liked or disliked by the students, which may make a certain meal choice more likely or draw more students to the cafeteria in the first place) may have influenced meal choices and, thus, the magnitude of the found effects. Second, while self-reported behavior and cafeteria meal data provided insights into food-related emissions, real-time tracking of individual dietary choices could offer more precise measurements less prone to self-report bias. Third, calculating CO_2e emissions, much like measuring psychological variables, involves uncertainties. For example, researchers using different databases, making different methodological choices and assumptions, may arrive at varying calculation results. While general tendencies are usually considered robust, the specific values for CO_2e emissions might differ slightly (Scrucca et al., 2020). Yet, the purpose of this study was not to provide precise, generalizable population-level estimates of the effect of environmental motivation on food-related behavior or CO_2e emissions. Rather, we aimed to offer some empirical support for our conceptual argument. Future studies should use larger samples and objective observation for further evidence. Fourth, our measure of emission knowledge has, in its adapted form, not been validated rigorously. Future studies could opt for recently developed and validated knowledge scales (Simon & Merten, 2024). Moreover, the measure we applied captures rather broad emission knowledge. If more specific emission knowledge is of interest, future studies could use measures directly tied to the behavior(s) in question. For example, these scales could make participants rank the actual available cafeteria meals based on their emissions. This would allow a more precise investigation of the question of how relevant this knowledge is to behavior and CO_2e emissions. Finally, we were only able to provide the absence of contradictory evidence as support for H2a/b. Given a larger sample, equivalence tests (see Lakens, 2017) could provide further support for an absence of a practically relevant effect.

4.5 Conclusion

In conclusion, our results are encouraging for psychological research that aims to understand psychological factors behind sustainable food behavior and ultimately seeks to contribute to climate change mitigation. Finding only a small association between CO_2e emissions and psychological factors does not necessarily imply that these factors lack practical relevance for reducing negative environmental consequences, including CO_2e emissions.

We want to close with an illustrative and potentially insightful hypothetical: If structural changes were to render the attractiveness of sustainable alternatives to the point where choosing sustainable behavior (such as sustainable cafeteria meals) becomes the default, while simultaneously ensuring that all sustainable options emit similarly low levels of CO_2e, how would the statistical association between environmental motivation and CO_2e emissions appear? It would most likely vanish entirely. In this sense, forcing a statistically non-significant relationship between CO_2e emissions and environmental motivation could constitute the pinnacle of intervention success.

5 Open science statement

All data and analysis scripts can be downloaded at: https://doi.org/10.17605/OSF.IO/CV3G7. The entire questionnaire can be found in the supplementary materials of this article. The analyses were not preregistered. We confirm that our paper includes all studies that we have conducted on this research question and that, for all studies reported, we have reported all measures, conditions, and data exclusions, as well as the justification for our sample size.

6 References

Bauske, E., Kibbe, A., & Kaiser, F. G. (2022). Opinion polls as measures of commitment to goals: Environmental attitude in Germany from 1996 to 2018. *Journal of Environmental Psychology*, *81*, Article 101805. https://doi.org/10.1016/j.jenvp.2022.101805

Bosshard, A., Berger, S., Lange, F., Sosa, A., Kankaanpää, E., Fellegi, E., Dydula, J., Pulicelli, M., Aliyeva, O., & Brick, C. (2024). Limited overlap among behavioral tasks, pro-environmental propensity, and carbon footprint. *Journal of Environmental Psychology*, *97*, Article 102297. https://doi.org/10.1016/j.jenvp.2024.102297

Boyle, J. E. (2011). Becoming vegetarian: The eating patterns and accounts of newly practicing vegetarians. *Food and Foodways*, *19*(4), 314–333. https://doi.org/10.1080/07409710.2011.630620

Brunner, F., Kurz, V., Bryngelsson, D., & Hedenus, F. (2018). Carbon label at a university restaurant – Label implementation and evaluation. *Ecological Economics*, *146*, 658–667. https://doi.org/10.1016/j.ecolecon.2017.12.012

Cadario, R., Li, Y., & Klesse, A.-K. (2025). Bridging the knowledge gap: Mapping carbon emissions to food items facilitates choices of plant-based over animal-based items. *Appetite*, *208*, Article 107910. https://doi.org/10.1016/j.appet.2025.107910

Camilleri, A. R., Larrick, R. P., Hossain, S., & Patino-Echeverri, D. (2019). Consumers underestimate the emissions associated with food but are aided by labels. *Nature Climate Change*, *9*(1), 53–58. https://doi.org/10.1038/s41558-018-0354-z

Cologna, V., Berthold, A., & Siegrist, M. (2022). Knowledge, perceived potential and trust as determinants of low- and high-impact pro-environmental behaviours. *Journal of Environmental Psychology*, *79*, Article 101741. https://doi.org/10.1016/j.jenvp.2021.101741

Fisher, R. A. (1992). Statistical methods for research workers. In S. Kotz & N. L. Johnson (Eds.), *Springer Series in Statistics. Breakthroughs in Statistics* (pp. 66–70). Springer New York. https://doi.org/10.1007/978-1-4612-4380-9_6

Hartmann, C., Lazzarini, G., Funk, A., & Siegrist, M. (2021). Measuring consumers' knowledge of the environmental impact of foods. *Appetite*, *167*, Article 105622. https://doi.org/10.1016/j.appet.2021.105622

Henn, L., Taube, O., & Kaiser, F. G. (2019). The role of environmental attitude in the efficacy of smart-meter-based feedback interventions. *Journal of Environmental Psychology*, *63*, 74–81. https://doi.org/10.1016/j.jenvp.2019.04.007

Hilton, D., Charalambides, L., Demarque, C., Waroquier, L., & Raux, C. (2014). A tax can nudge: The impact of an environmentally motivated bonus/malus fiscal system on transport preferences. *Journal of Economic Psychology*, *42*, 17–27. https://doi.org/10.1016/j.joep.2014.02.007

Ivanova, D., Barrett, J., Wiedenhofer, D., Macura, B., Callaghan, M., & Creutzig, F. (2020). Quantifying the potential for climate change mitigation of consumption options. *Environmental Research Letters*, *15*(9), Article 93001. https://doi.org/10.1088/1748-9326/ab8589

Kaiser, F. G. (2020). GEB-50. General Ecological Behavior Scale. *Open Test Archive.* Advance online publication. https://doi.org/10.23668/psycharchives.3453

Kaiser, F. G., Byrka, K., & Hartig, T. (2010). Reviving Campbell's paradigm for attitude research. *Personality and Social Psychology Review*, *14*(4), 351–367. https://doi.org/10.1177/1088868310366452

Kaiser, F. G., Doka, G., Hofstetter, P., & Ranney, M. A. (2003). Ecological behavior and its environmental consequences: A life cycle assessment of a self-report measure. *Journal of Environmental Psychology*, *23*, 11–20. https://doi.org/10.1016/s0272-4944(02)00075-0

Kaiser, F. G., Merten, M., & Wetzel, E. (2018). How do we know we are measuring environmental attitude? Specific objectivity as the formal validation criterion for measures of latent attributes. *Journal of Environmental Psychology*, *55*, 139–146.

Lakens, D. (2017). Equivalence tests: A practical primer for t tests, correlations, and meta-analyses. *Social Psychological and Personality Science*, *8*(4), 355–362. https://doi.org/10.1177/1948550617697177

Lange, F. (2023). Behavioral paradigms for studying pro-environmental behavior: A systematic review. *Behavior Research Methods*, *55*(2), 600–622. https://doi.org/10.3758/s13428-022-01825-4

Lange, F. (2024). What is measured in pro-environmental behavior research? *Journal of Environmental Psychology*, *98*, Article 102381. https://doi.org/10.1016/j.jenvp.2024.102381

Lange, F., & Dewitte, S. (2019). Measuring pro-environmental behavior: Review and recommendations. *Journal of Environmental Psychology*, *63*, 92–100. https://doi.org/10.1016/j.jenvp.2019.04.009

Laroche, M., Tomiuk, M.-A., Bergeron, J., & Barbaro-Forleo, G. (2002). Cultural differences in environmental knowledge, attitudes, and behaviours of Canadian consumers. *Canadian Journal of Administrative Sciences / Revue Canadienne Des Sciences De L'administration*, *19*(3), 267–282. https://doi.org/10.1111/j.1936-4490.2002.tb00272.x

Leiner, D. J. (2024). *SoSci Survey* (Version 3.5.01) [Computer software]. https://www.soscisurvey.de

Liu, P., Teng, M., & Han, C. (2020). How does environmental knowledge translate into pro-environmental behaviors? The mediating role of environmental attitudes and behavioral intentions. *The Science of the Total Environment*, *728*, Article 138126. https://doi.org/10.1016/j.scitotenv.2020.138126

Lo Dato, E., Gostoli, S., & Tomba, E. (2024). Psychological Theoretical Frameworks of Healthy and Sustainable Food Choices: A Systematic Review of the Literature. *Nutrients*, *16*(21), Article 3687. https://doi.org/10.3390/nu16213687

Meier, T., & Christen, O. (2013). Environmental impacts of dietary recommendations and dietary styles: Germany as an example. *Environmental Science & Technology*, *47*(2), 877–888. https://doi.org/10.1021/es302152v

Mundt, D., List, M. K., Scharf, F., & Ebersbach, M. (2026). An experimental approach to assess the impact of three environmental knowledge types on food-related behavioral intentions and choices. *Environmental Psychology Open*, *30*, Article 34. https://doi.org/10.69805/epo.v30.a34

Nakagawa, S., & Schielzeth, H. (2013). A general and simple method for obtaining R2 from generalized linear mixed-effects models. *Methods in Ecology and Evolution*, *4*(2), 133–142. https://doi.org/10.1111/j.2041-210x.2012.00261.x

Neef, N. E., Wakabayashi, K., Briem, A.-K., Bauknecht, D., & Otto, S. (2025). *Environmental Motivation and Food.* [Data set]. OSF. https://doi.org/10.17605/OSF.IO/CV3G7

Neef, N. E., Zabel, S., & Otto, S. (2024). Climate change mitigation: A question of humanitarian or environmental motivation? *Journal of Environmental Psychology*, *100*, Article 102483. https://doi.org/10.1016/j.jenvp.2024.102483

Neef, N. E., Zietlow, K., & Otto, S. (2026). Prosocial propensity and water-saving behaviour: A study in Jordan and Germany / Propensión prosocial y comportamiento de ahorro de agua: Un estudio en Jordania y Alemania. *PsyEcology: Bilingual Journal of Environmental Psychology*. Advance online publication. https://doi.org/10.1177/21711976251412673

Neves, C., Oliveira, T., & Santini, F. (2025). Understanding the determinants of sustainable consumption behavior: Insights from a meta and weight analysis. *Journal of Environmental Management*, *393*, Article 126932. https://doi.org/10.1016/j.jenvman.2025.126932

Nielsen, K. S., Brick, C., Hofmann, W., Joanes, T., Lange, F., & Gwozdz, W. (2022). The motivation–impact gap in pro-environmental clothing consumption. *Nature Sustainability*, *5*(8), 665–668. https://doi.org/10.1038/s41893-022-00888-7

Peri, M., Trentinaglia, M. T., Adler, M., Zanaboni, A. M., & Baldi, L. (2025). Framing the meat consumption transition: A statistical learning approach to explore the factors shaping young adults' food choices in Germany and Italy. *Meat Science*, *228*, Article 109899. https://doi.org/10.1016/j.meatsci.2025.109899

Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, *360*(6392), 987–992. https://doi.org/10.1126/science.aaq0216

Posit Team. (2025). *RStudio: Integrated Development Environment for R* (Version 2024.12.1+563) [Computer software]. http://www.posit.co/

Rasch, G. (1960). *Studies in mathematical psychology: I. Probabilistic models for some intelligence and attainment tests.* Nielsen & Lydiche.

Ritchie, H. (2020). You want to reduce the carbon footprint of your food? Focus on what you eat, not whether your food is local. *Our World in Data*. https://ourworldindata.org/food-choice-vs-eating-local

Saile, K., Neef, N. E., Hüttl-Maack, V., & Otto, S. (2025). Speaking green – Expressing a message in a foreign language fosters consumers' pro-environmental choices. *International Journal of Advertising*, *40*(1), 66–86. https://doi.org/10.1080/02650487.2024.2425220

Sato, H., & Oldroyd, J. (2025). The effectiveness of interventions to improve environmentally sustainable and healthy dietary behaviours among European adults: A systematic review. *Appetite*, *216*, Article 108302. https://doi.org/10.1016/j.appet.2025.108302

Scrucca, F., Baldassarri, C., Baldinelli, G., Bonamente, E., Rinaldi, S., Rotili, A., & Barbanera, M. (2020). Uncertainty in LCA: An estimation of practitioner-related effects. *Journal of Cleaner Production*, *268*, Article 122304. https://doi.org/10.1016/j.jclepro.2020.122304

Simon, C. E., & Merten, M. J. (2024). Better climate action through the right knowledge? Development and validation of an item-response-theory scale measuring climate effectiveness knowledge. *Frontiers in Psychology*, *15*, Article 1347407. https://doi.org/10.3389/fpsyg.2024.1347407

Spearman, C. (1904). The proof and measurement of association between two things. *The American Journal of Psychology*, *15*(1), 72–101. https://doi.org/10.2307/1412159

Taube, O., Kibbe, A., Vetter, M., Adler, M., & Kaiser, F. G. (2018). Applying the Campbell paradigm to sustainable travel behavior: Compensatory effects of environmental attitude and the transportation environment. *Transportation Research Part F: Traffic Psychology and Behaviour*, *56*, 392–407. https://doi.org/10.1016/j.trf.2018.05.006

Timmons, S., Andersson, Y., Lee, M., & Lunn, P. (2024). What is preventing individual climate action? Impact awareness and perceived difficulties in changing transport and food behaviour. *ESRI Research Series, 186.* https://doi.org/10.26504/rs186

Treu, H., Nordborg, M., Cederberg, C., Heuer, T., Claupein, E., Hoffmann, H., & Berndes, G. (2017). Carbon footprints and land use of conventional and organic diets in Germany. *Journal of Cleaner Production*, *161*, 127–142. https://doi.org/10.1016/j.jclepro.2017.05.041

Verfuerth, C., Henn, L., & Becker, S. (2019). Is it up to them? Individual leverages for sufficiency. *GAIA*, *28*(4), 374–380. https://doi.org/10.14512/gaia.28.4.9

Waite, R., Vennard, D., & Pozzi, G. (2019). *Tracking progress toward the cool food pledge: setting climate targets, tracking metrics, using the Cool Food Calculator, and related guidance for pledge signatories.* World Resources Institute. https://www.wri.org/research/tracking-progress-toward-cool-food-pledge

Wynes, S., & Nicholas, K. A. (2017). The climate mitigation gap: education and government recommendations miss the most effective individual actions. *Environmental Research Letters*, *12*(7), Article 74024. https://doi.org/10.1088/1748-9326/aa7541

Wynes, S., Zhao, J., & Donner, S. D. (2020). How well do people understand the climate impact of individual actions? *Climatic Change*, *162*(3), 1521–1534. https://doi.org/10.1007/s10584-020-02811-5

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