Intersecting perspectives: Advocating for sustainable family meals across generations

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ABSTRACT

Adolescents in Germany eat fewer animal products than their parents, often for sustainability reasons. We investigated how adolescents differ from their parents' generation in sustainability food-choice motives, consumption of animal products, and corresponding behaviors such as advocating for and influencing decisions towards more sustainable family meals. In an online questionnaire, an educationally diverse sample of 500 adolescents ($M = 17.9$ years, range $= 15$–20) and 500 adults of their parents' generation ($M = 52.2$ years, range $= 45$–60) reported food-choice motives, their own and their family's diet style, how they advocate for sustainable food decisions at family meals (e.g., less meat), and how they influence different steps in family meal planning (e.g., grocery shopping). The two generations did not differ in sustainable food motives and mean consumption frequency of meat and animal products, but adolescents reported three times more often than their parents' generation to never eat meat. At shared family meals they advocated for eating plant-based substitutes ($d = 0.27$, $p < 0.001$) and other animal products ($\beta = -0.15$, $p = 0.02$) more often than their parents' generation, but not for eating less meat. Adolescents advocated more frequently for sustainable food decisions at shared meals the more important sustainability motives were to them ($\beta = 0.53$, $p < 0.001$), and the less meat ($\beta = -0.35$, $p < 0.001$) and fewer other animal products ($\beta = -0.11$, $p = 0.015$) they consumed. Adolescents motivated towards sustainability have the potential to impact the family's dietary choices through reverse socialization processes. These findings challenge current theories that suggest only parents influence their children, neglecting the role of adolescents as potential agents of change for improved family and planetary health.

1. Introduction

One of the most important influences on the climate crisis is livestock farming, which contributes between 11% and 19% to the worldwide greenhouse gas emissions produced by humans (Food and Agriculture Organization of the United Nations, 2022; Xu et al., 2021). The EAT-Lancet Commission therefore has advocated reducing consumption of meat and other animal products to improve planetary and human health (Willett et al., 2019). Although this planetary health diet may not be optimized for all regions of the world and all micronutrients (Beal et al., 2023), scientists agree on the necessity of reducing animal products in the Western diet. In Germany, such a reduction can already be observed (Bundesministerium für Ernährung und Landwirtschaft [BMEL], 2019, 2021, 2023): Especially adolescents and young adults have been continuously eating less meat over the past 5 years. Whereas

in 2019, 8% of 14- to 29-year-olds declared eating vegetarian or vegan, 21% reported doing so in 2023. This corresponds to a twofold increase in vegetarians and vegans compared to the general population, and a 2.5-fold increase compared to their parents' generation (age 45–59 years). Plant-based substitutes are also well accepted in the younger age group: For example, 100% of vegans but also 60% of flexitarians and 34% of omnivores reported liking dairy substitutes (Zühlsdorf et al., 2021).

Adolescents and young adults state that climate change is a major motivation for this behavior: About 40% critically question their meat consumption for climate reasons whereas only 4% see no need to reduce their meat intake (Zühlsdorf et al., 2021). Recent population-based surveys from Germany have assessed general attitudes toward the environment and sustainability across age groups. Adolescents and young adults age 14–29 years reported the highest pro-climate attitudes

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compared to all other age groups and received a higher readiness-to-change score when asked about adopting sustainable behavior, including nutrition, than their parents' generation (40–60 years; mean difference of 0.5 to > 1 scale point on a scale of 1–10; Belz et al., 2022, p.40).

Importantly, adolescents do not eat as individuals. They often live with parents and siblings and eat many of their meals in a family context (e.g., 80% of 12- to 17-year-old adolescents reported often eating dinner with their families; Frank et al., 2019). Accordingly, to reduce their meat consumption, that is, to eat in line with their own motives and values regarding food, they need to engage in the family-meal decision process. Given that motives and values in adolescents often differ from those of their parents' generation, they will often need to overcome obstacles to achieve their goals. And they do. Adolescents do not just eat what has been put on the table; they take an active role in meal planning, for example, by deciding what types of restaurants the family goes to (Chen et al., 2016), bringing new products from outside (e.g., school, peers) into the family (Ayadi & Bree, 2010; Williams et al., 2019), and encouraging the family to try meat substitutes for dinner (Pater et al., 2022). Although parents remain nutritional gatekeepers, adolescents take the opportunity to actively change family food choices. This is in line with family systems theory, which sees families as self-regulating systems with the ability to make adaptive changes. If one part of the system changes its attitudes or behavior, this change affects all parts of the system (Baptist & Hamon, 2022).

Researchers and nongovernmental organizations have suggested that children are optimal agents for communicating climate change information to their parents, especially when other types of awareness campaigns do not achieve the desired goal (Lawson et al., 2018; UNESCO, 2020). This process is called "reverse socialization" (Gentina & Muratore, 2012) and has been examined in the context of consumer socialization theory: Usually children learn from previous generations, but there are also cases where knowledge, skills, and attitudes related to consumption are passed from young to old. One well-known example is adolescents teaching their parents about technology (Watne et al., 2011), but initial studies have also shown an influence of children and adolescents on their parents' general pro-environmental behavior (e.g., car use; Kong & Jia, 2023; Singh et al., 2020) and environmental literacy (Liu et al., 2022).

Older research on children influencing nutrition in the family context indicated that family meals become less healthy when adolescents are allowed to participate in the decision-making process, because they choose more foods with high sugar and high fat content (De Bourdeaudhuij & Van Oost, 1998; Nørgaard & Brunsø, 2011). Thus, this research does not suggest that children influence their parents in the direction of a sustainable diet in the sense of the planetary health diet, as this is primarily based on the consumption of fruits, vegetables, whole grains, and legumes (Willett et al., 2019). However, adolescents could be sustainability agents—not necessarily for eating more fruits and vegetables, but potentially for eating fewer animal products and replacing them with other products instead. For example, McKeown and Nelson (2018) found that, given free choice, adolescents would eat few fruits and vegetables and would be more likely to eat high-carbohydrate foods, which could potentially also be a replacement for animal products. Other authors showed that although adolescents are more likely to choose unhealthy foods, when they themselves suggest omitting unhealthy products (such as candy and soft drinks), this has a great impact on their family's behavior (De Bourdeaudhuij & Van Oost, 1998). In addition, younger adults are more open to trying protein alternatives (e.g., in one survey, 62% of 14- to 29-year-olds had bought meat and dairy alternatives more than once before, but only 35% of people age 45 to 59; BMEL, 2023; Clark & Bogdan, 2019) and children reported that they had been suggesting meat substitutes for joint family dinners (Pater et al., 2022). Understanding adolescents' motivation is central to comprehending under what circumstances they influence family meals and to what extent (Beatty & Talpade, 1994). For example, personal motivation

worked as one predictor of adolescents' perceived and also actual influence on family meal decisions regarding fish consumption (Olsen & Ruiz, 2008). Also, adolescents who abstained from consuming animal products often did so for political reasons and should therefore have had a high personal motivation (Zühlsdorf et al., 2021).

1.1. Research gaps

The literature mentioned above clearly demonstrates that a larger percentage of people in adolescence are concerned about the adverse effects of meat consumption on climate change than in their parents' generation and that—also because of frequent family meals—adolescents can potentially be important agents of change. Yet, although recent surveys have addressed adolescents' preferences or adolescents' openness to introducing alternatives to meat, few studies have explicitly tested how differences in sustainability food-choice motives translate into food choices, such as consumption of animal products, between generations. Further, it is unclear how and under what circumstances a preference for more sustainable, healthy nutrition in adolescents leads to advocating for less consumption of meat or other animal-based foods at the family table (e.g., getting involved in family meal planning, grocery shopping, meal preparation). Also, little attention has been paid to generational differences in sustainability food-choice motives and eating by gender, age, and education.

1.2. Hypotheses

On the basis of the theoretical considerations and research described above, we hypothesized that (1) sustainability food-choice motives play a more important role in adolescents' food choices than in the food choices of their parents' generation and that (2a) adolescents consume meat and (2b) other animal products less often than their parents' generation. Further, we assumed that adolescents advocate more for lessening consumption of meat (3a) and other animal-based products (3b) and increasing consumption of plant-based substitutes (3c) at joint family meals than their parents' generation. Focusing on adolescents' motivation for engaging in family meal planning, we hypothesized that (4a) the less adolescents consume animal products themselves, the more they advocate for sustainable family meal decisions and (4b) the more they report more general involvement in family meal planning.

1.3. Exploratory questions (EQs)

Additional to testing our hypotheses, we explored how the generations differ in (EQ 1a) their recognition of the importance of various food-choice motives, (EQ 1b) their advocacy of different food groups, and (EQ 1c) their influence on several steps of meal planning (e.g., grocery shopping, menu planning). Further, we asked (EQ 2) if differences in age (i.e., younger adolescents vs. older adolescents/young adults), gender, and education relate to differences in sustainability food-choice motives and eating behavior in both generations. Last, we examined (EQ 3) if endorsement of sustainability food-choice motives relates to the frequency of advocating for more sustainable foods and higher involvement in family meal planning.

2. Methods

2.1. Data transparency

This study was preregistered on OSF registries (https://osf.io/w6f8k/). All data, analysis code and supplemental material are freely available at https://osf.io/3pkzt/?view_only=797754991d1e41f89d21366225111bd2.

This study was approved by the ethics commission of the University of Mannheim (EK Mannheim 35/22). Participants gave informed consent to participate in the study.

2.2. Design and procedure

Participants were 500 adolescents as well as 500 unrelated adults of their parents' generation recruited via the respondi access panel, an established German market research service provider with vast expertise in conducting scientific surveys. To be eligible, adolescents had to be between 14 and 20 years old (we recognize that people are usually called adults from 18 years of age on; yet the majority of them fall in the age range of adolescence and to distinguish this age group from their parents' generation we refer to them as "adolescents" throughout the manuscript). Living at home was not a requirement, but they could not yet have children of their own, so that joint family meals referred to eating together with their parents. Adults, on the other hand, had to have at least one child and needed to be between 45 and 60 years old. Potential participants were excluded if they stated they never ate with their family. Participants responded to a 5-min questionnaire. They received compensation in the form of points for participation, which they could exchange for cash or vouchers as part of their respondi-panel membership.

2.3. Measures

2.3.1. Participant characteristics

Participants reported their age, gender (male, female, nonbinary), and education (current type of schooling/highest level of academic education). Additionally, adolescent participants were asked about the age of their parents, and participants of their parents' generation about the age of their oldest child. Participants further reported on their family-meal frequency (on a 5-point scale with answer options "[nearly] every day," "3–5 times a week," "1–2 times a week," "less than once a week," "never").

2.3.2. Food-choice motives

To assess different food-choice motives, participants were asked to rate 19 items on eating motives, for example, "I eat what I eat … because it is healthy" or "because it is fast to prepare." Answers were given on a 5-point Likert scale from "never applies" to "always applies" with an additional answer option "I don't understand" (adapted from the short version of The Eating Motivation Survey; Renner et al., 2012). Three additional items on sustainability and one item on animal welfare were assessed (e.g., "I eat what I eat … because it is good for the environment" or "because animals don't have to suffer"; adapted from the Vegetarian Eating Motives Inventory; Hopwood et al., 2020). Cronbach's alpha for the three additional items on sustainability was 0.93 for adolescents and 0.92 for adults of their parent's generation. A mean score for those three sustainability items was calculated ('sustainability motive score').

2.3.3. Diet style

Participants were asked about their personal diet style regarding sustainability using a survey question with different items based on the recommendations for sustainable diets of the German Nutrition Society (Renner et al., 2021) and answers given by participants in the Eurobarometer 93.2 survey (European Commission Brussels, 2021), who reported on important aspects of sustainable diets. We asked participants how many days a week the following statements applied to them: Eating meat, eating other animal products (e.g., milk, cheese, eggs), eating plants (fruits, vegetables, grains, legumes, nuts), eating organically produced food, eating food that is grown in the region and is in season, eating food wrapped in a lot of plastic, and throwing away food. The possible answers for all options were "never," "1x," "2–4x," "at least 5x," and "always" with a fallback option "I don't understand" (adapted from questionnaire options of the German Consumer Expert Council [(Sachverständigenrat für Verbraucherfragen, Berlin, 2021). Further, one item was constructed to assess the consumption of plant-based substitutes (trying "new" plant-based foods [e.g., tofu, oat milk, soy meat]). The same question with all food groups was asked for their

family's diet style to assess baseline consumption (e.g., if the entire family eats vegetarian, the participant cannot advocate for eating less meat.

2.3.4. Family-meal advocating for sustainable food decisions

To record self-reported advocacy for specific food groups and, participants were first given the study's definition of a family meal ("A joint family meal occurs when at least one parent and one child eat together"). Next, they rated eight statements on a 5-point Likert scale (from "never" to "always" plus an additional option "I do not understand," formulated in parallel to the diet-style item. The statements started with the stem "When we eat meals together as a family, I advocate for …" followed by "eating less meat", "eating less of other animal products (e.g., milk, cheese, eggs)", "eating more plants (fruits, vegetables, grain, legumes, nuts)", "trying 'new' plant-based foods (e.g., tofu, oat milk, soy meat)", "eating more organically produced food", "eating more food that is grown in the region and is in season", "eating less food wrapped in a lot of plastic" and "throwing away less food." A higher score means more frequent advocating for sustainable eating. A mean score for all advocating items were calculated to gain an initial understanding for overall advocacy frequency related to sustainable eating in the context of family meals ('overall advocating score').

2.3.5. Influence on meal planning

To capture to what extent and at what step participants influence meal planning, we used items based on Perrea et al. (2012) who—based on a diary study design—empirically identified and analyzed the individual steps of a mealtime planning process. Participants were asked to rate the following six items (on a 5-point Likert scale from "never" to "always" plus the additional response option "I don't understand"): "I influence what we eat together as a family … when planning a specific meal," "when planning the groceries," "at the supermarket during shopping," "during the preparation of the meal," "while we are sitting at the table eating," "at another step." A mean score over all process steps were calculated to gain an initial understanding for overall influence frequency ('general influence score').

2.4. Participants

See Table 1 for detailed sample characteristics. The age of the adolescents' generation sample responding to our survey was on average 4 years younger than the age of the oldest child of the parents' generation sample ($M = 21.88$, $SD = 8.10$). Yet, given that they were asked about their oldest child and most families in Germany have more than one child (Statistisches Bundesamt, 2020), it is reasonable to assume that the sampled adults represented the parent generation of the adolescent survey participants reasonably well. The parent-aged respondents in our sample were on average 3 years younger than the parents of the adolescent survey participants ($M_{Parent1} = 49.60$, $SD_{Parent1} = 6.64$; $M_{Parent2} = 49.92$, $SD_{Parent2} = 6.67$). Yet given the large variability in age (from 33 to 74 years) and that the adolescent participants did not have to be the oldest child of a family, we again assumed that the parent-generation survey participants represented the adolescent respondents' parents' generation reasonably well.

2.5. Statistical analyses

Data quality was ensured through early exclusion of speeders (defined as participants who needed less than 2 min for the entire questionnaire) during data collection by the access panel. This means that the 500 adolescents and 500 adults in our sample all took a reasonable amount of time to complete the survey. Number of missing values per outcome variable varied between 0% for meat consumption frequency to 10% for general influence score ($Mdn = 1.3\%$). Participants with missing values were excluded from the respective analysis (pairwise deletion). The assumptions for statistical tests were checked and

Table 1
Sample characteristics.

Variable	Adolescents'generation		Parent's generation	
	M	*SD*	*M*	*SD*
Age	17.93	1.21	52.19	4.65
	n	*%*	*n*	*%*
Gender				
Female	356	71.20	312	62.40
Male	135	27.00	186	37.20
Other	9	1.80	2	<0.01
Education: Highest qualification earned				
None/still in school	270	54.00	1	0.20
Secondary school diploma	69	30.00[a]	250	50.00
Higher level/qualification for university entrance	148	64.30[a]	94	18.80
College/University degree	10	4.30[a]	147	29.40
Other	3	1.30[a]	8	1.60
Family-meal frequency				
(Nearly) every day	297	59.40	312	62.40
3–5 times a week	114	22.80	96	19.20
1–2 times a week	89	17.80	92	18.40
Less that 1–2 times a week	0	0	0	0

Note. N = 1000 (500 per generation). For education, categories refer to highest qualification earned: None = no diploma/still in school; Secondary = high school diploma; Higher/Qual = high school diploma that qualifies for university entrance in Germany ('(Fach-)Abitur'); College/University = college or university degree. Numbers above bars are number of participants in each category.

[a] Calculated only for 230 adolescents who had already finished school for an easier comparison to adult proportions.

Welch's *t*-test was used when no variance homogeneity can be assumed.

For Hypothesis 1, we tested for generational difference in the sustainability motive score using a *t*-test. To test Hypothesis 2a and b, we also conducted *t* tests. As the categories depicting dietary style are strictly ordinal rather than metrically scaled, we conducted an additional χ^2 test of independence to examine whether generational affiliation and consumption of animal products are related, which was not preregistered. To address Hypothesis 3a–c, we compared the generations using *t* tests. For each of the parts of Hypothesis 3, we additionally used an equivalent linear regression model to include the families' consumption frequency of meat, other animal products, and plant-based substitutes as a control variable. For Hypothesis 4a and b, we examined only adolescents. For each hypothesis, we conducted a regression model with (a) the overall advocating score and (b) the general influence score as dependent variables. We included the consumption of meat and other animal products first as continuous predictors. In addition to these preregistered analyses, we tested Hypothesis 4a and b with the consumption of meat and other animal products as categorial predictors using for each a one-way analysis of variance (ANOVA) with Tukey post hoc tests.

We descriptively compared the importance of all food-choice motives by using the mean value of each item to form a ranking for both generations (EQ 1a). Additionally, we investigated which food category and for which meal planning step the generations reported having the most impact (EQ 1b and c). Further, we looked at our main outcome variables separated for age, gender, and education to identify potential patterns (EQ 2). We also conducted two regression models parallel to our test of Hypothesis 4a and b using the sustainability motive score as a predictor for the advocating and general influence score (EQ 3). An overview table with information on all hypotheses, exploratory questions and results can be found in supplemental materials. Data were analyzed using RStudio version 2023.03.0 + 386 (Posit team, 2023), using the packages *psych* (v2.3.9; Revelle, 2023), *car* (Fox & Weisberg, 2019) and *effecsize* (Ben-Shachar et al., 2020) for the main analyses.

3. Results

For Details on means, standard deviations, and correlation co-efficients for investigated variables see Tables 2a and 2b.

3.1. H1: No differences in sustainability food-choice motives between generations

We did not find significant differences in the sustainability food-choice motives between generations, $t_{\text{Welch}}(948.16) = -1.24$, $p = .892$ (one-sided), *MD* = -0.08, 95% confidence interval (CI) [−0.20], *d* = 0.08, and thus Hypothesis 1 was not supported by our data.

Table 2a
Means and standard deviations of sustainable food motive items, items measuring advocating for sustainable family meals, and influence on mealtime planning.

	Adolescents' generation			Parents' generation			p-value
	M	SD	N	M	SD	N	
Sustainable food motives							
Because it is sustainable.	3.00	1.16	493	3.13	1.05	483	
Because it is good for the environment.	2.98	1.18	490	2.98	1.12	477	
Because it has less of an impact on the environment.	2.97	1.15	486	3.06	1.11	477	
Sustainable food motive score	2.98	1.09	483	3.06	1.01	469	0.892
Advocating for sustainable family meals							
… less meat.	3.04	1.37	497	3.08	1.23	499	0.667
… less other animal products.	2.34	1.20	499	2.30	1.11	499	0.265
… trying "new" plant-based foods.	2.79	1.38	499	2.43	1.29	500	<0.001
… eating plants.	3.23	1.25	498	3.57	1.16	499	
… eating organically produced food.	2.88	1.23	497	3.07	1.25	499	
… eating food that is grown in the region and is in season.	3.06	1.17	498	3.07	1.10	499	
… eating food wrapped in a lot of plastic.	3.24	1.25	497	3.36	1.25	498	
… throwing away food.	3.60	1.23	498	4.00	1.25	497	
Overall advocating score	3.03	0.94	491	3.18	0.82	496	
Influence on mealtime planning							
… when planning a specific meal.	3.53	1.07	498	4.16	0.94	497	
… when planning the groceries.	3.50	1.11	497	4.21	0.93	497	
…. at the supermarket during shopping	3.53	1.15	497	4.16	0.95	497	
… during the preparation of the meal.	3.26	1.12	497	3.99	1.08	496	
… while we are sitting at the table eating.	3.46	1.14	492	3.82	1.12	496	
… at another step.	3.21	1.09	451	3.57	1.07	458	
General influence score	3.39	0.76	443	3.99	0.81	457	

Note. All items were measured on a 5-point Likert scale. Anchor points were for sustainable food motive items from "never applies" to "always applies"and for advocating as well as for influence items from "never" to "always". P-values only shown for comparisons that are tested inferential statistical as part of the hypotheses. Sustainable food motive score = mean score for 3 sustainability items; Overall advocating score = mean score for all advocating for sustainable family meals items; General influence score = mean score for all Influence on mealtime planning items.

Table 2b

Correlations of sustainable food motive score, overall advocating score and general influence score.

| Adolescents' generation	sustainable food motive score	overall advocating score	general influence score
Sustainable food motive score	1		
Overall advocating score	0.54	1	
General influence score	0.27	0.44	1
Parents' generation			
Sustainable food motive score	1		
Overall advocating score	0.56	1	
General influence score	0.22	0.28	1

Note. *Sustainable food motive score= mean score for 3 sustainability items; Overall advocating score=mean score for all advocating for sustainable family meals items; General influence score= mean score for all Influence on mealtime planning items.*

3.2. H2: Adolescents eat more often no meat at all

On average, there was no significant difference in the frequency of meat consumption between generations, $t_{Welch}(922.65) = -0.25$, $p = 0.399$ (one-sided), $MD = 0.016$, 95% CI [0.09], $d = 0.02$. However, looking at the distribution instead of the mean (Fig. 1), we found that adolescents were more than three times as likely to never eat meat than their parents' generation. They also stated more frequently that they always eat meat. The χ^2 test of independence shows that generation and meat consumption were interdependent, $\chi^2(4) = 72.198$, $p < 0.001$, $\varphi = 0.26$. For other animal products, we found neither a significant difference in means of generations, $t(998) = 0.52$, $p = 0.699$ (one-sided), $MD = 0.032$, 95% CI [, 0.13], $d = 0.03$, nor a significant dependence on consumption frequency and generation, $\chi^2(4) = 8.441$, $p = 0.077$.

3.3. H3: Adolescents advocate for other animal products and new plant-based products

Adolescents were significantly more likely to advocate for trying more new plant-based products at shared meals, $t(997) = 4.26$, $p < 0.001$ (one-sided), $MD = 0.36$, 95% CI [0.22], $d = 0.27$. This effect also
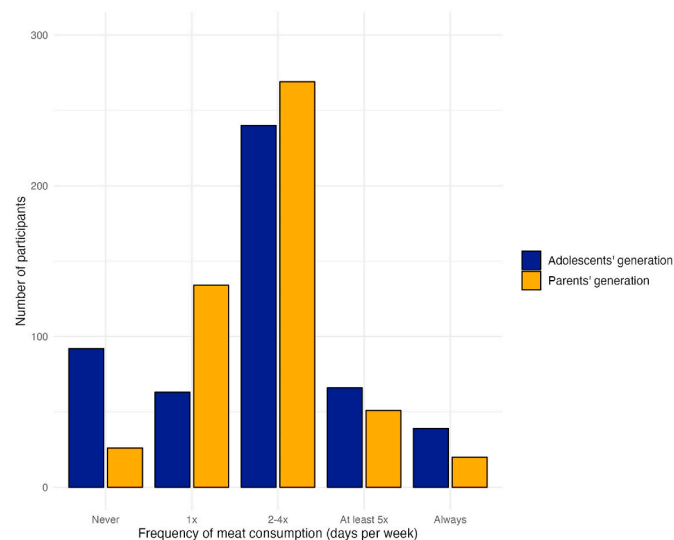
held when we controlled for the consumption of new plant-based products in the family. Contrary to our expectations, we did not find a mean difference for advocating eating less meat, $t_{Welch}(980.6) = -0.44$, $p = 0.669$, (one-sided), $MD = -0.04$, 95% CI [−0.17], $d = 0.03$, or less of other animal products, $t(996) = 0.63$, $p = 0.265$ (one-sided), $MD = 0.05$, 95% CI [−0.07], $d = 0.04$. When we additionally controlled for the amount of other animal products consumed in the family, adolescents were significantly more likely than their parents' generation to advocate for reducing the amount of other animal products consumed, $\beta = -0.15$, $F(2,991) = 38.07$, $p = 0.02$, $R^2 = 0.07$, indicating a suppressor effect which describes the increase of the model's predictive power through inclusion of an additional predictor. We did not find this effect for meat consumption when we controlled for family consumption, $\beta = -0.12$, $F(2,991) = 37.33$, $p = 0.148$, $R^2 = 0.07$.

3.4. H4: Adolescents consuming less animal products advocate for more sustainable family meals

Focusing only on adolescents, a negative linear trend of the relationship between frequency of meat consumption and reported advocacy of sustainable food decisions at family meals was observed (see Fig. 2).

The linear regression model with overall advocating score as the dependent variable and consumption of meat and other animal products as the two predictors showed a significant effect for both predictors (meat: $\beta = -0.35$, $p < 0.001$; other animal products: $\beta = -0.11$, $p = 0.015$), $F(2,488) = 50.6$, $R^2 = 0.17$. Adolescents who ate less meat and less of other animal products advocated more for sustainable family meal decisions.

The additionally conducted ANOVAs showed a significant effect for meat, $F(4,486) = 23.93$, $p < 0.001$) and other animal products, $F(4,486) = 9.52$, $p < 0.001$. For meat, post hoc tests indicated that advocacy clearly differed between the three frequency categories of meat consumption (i.e., never, sometimes [1x; 2–4x], often [at least 5; always]). For other animal products, the pattern was less clear and suggests that major differences could be found between those eating other animal products never, 1x, or 2–4x per week versus those eating them at least 5x or always (see Tables S1 and S2 in the Supplemental Materials for statistical details of the post hoc tests).

The frequency of consuming meat or other animal products did not

Fig. 1. Meat Consumption Frequency for Both Generations
Note. N = 500 per generation.

Fig. 2. Adolescents Advocating for Sustainable Food Decisions at Family Meals by Weekly Meat Consumption Frequency
Note. Overall advocating score is the sum score of all items that measure frequency of advocating for more sustainable family meals (less meat, less of other animal products, more plants, trying "new" plant-based foods, more organically produced food, more food that is grown in the region and is in season, less food wrapped in a lot of plastic, throwing away less food). Violins show density of distribution per category in orange, medians and quartiles blue. *N = 491* owing to missing values.

predict the general influence score (mean score of reported influence on all meal-planning step items)—neither in the continuous analyses (meat: $\beta = -0.04$, $p = 0.42$; other animal products: $\beta = -0.01$, $p = 0.844$), $F(2,440) = 0.49$, nor in the additional categorical analyses to account for the categorical nature of the predictors, meat: $F(4,438) = 0.661$, $p = 0.661$; other animal products: $F(4,438) = 0.32$, $p = 0.864$.

3.5. EQ 1a: Habits for adolescents, naturalness for parents?

We found both similarities and clear differences in food-choice motives between adolescents and their parents' generation: Both generations rated taste as the most important motive, closely followed by enjoyment. The two least important motives were also similar—eating because of being sad and because others like it. The clearest differences were found in the motive "naturalness," which adolescents rated as considerably less important than their parents' generation (Rank 15 vs. 8). On the other hand, habit played a more important role for adolescents (Rank 3 vs. 9). Table 3 shows mean scores and ranks of all food-choice motives for the two generations.

3.6. EQ 1b and 1c: Parents report more influence in general

Descriptively, adolescents reported a slightly lower advocating for sustainable food decisions at family meals than their parents' generation (overall M = 3.03 vs. 3.18)but rated their advocacy specifically for eating less of other animal products and for trying "new" plant-based foods more highly than their parents' generation did (see Table 2a for details). Both generations reported that their most frequent advocacy was for avoiding food waste (M = 3.60 for adolescents and M = 4.0 for parents' generation).

The parents' generation reported greater general influence on meal

Table 3
Ratings of eating behavior motives.

Motive: I eat what I eat …	Adolescents' generation			Parents' generation		
	M	*SD*	Rank	*M*	*SD*	Rank
Because it tastes good.	4.42	0.77	1	4.46	0.70	1
Because I enjoy it.	3.72	0.97	2	3.94	0.94	2
Because I am accustomed to eating it.	3.60	0.93	3	3.37	1.05	9
Because it belongs to certain situations.	3.54	1.09	4	3.51	1.12	6
Because I need energy.	3.54	1.09	4	3.74	1.03	4
Because it is quick to prepare.	3.52	0.94	6	3.45	0.97	7
Because it is healthy.	3.38	1.02	7	3.79	0.91	3
Because it is inexpensive.	3.28	1.03	8	2.98	1.05	13
Because it is social.	3.23	1.12	9	3.63	1.03	5
Because the presentation is appealing (e.g., packaging).	3.06	1.12	10	3.06	1.15	11
Because it is sustainable.	3.00	1.16	11	3.13	1.05	10
Because it is good for the environment.	2.98	1.18	12	2.98	1.12	13
Because it has less of an impact on the environment.	2.97	1.15	13	3.06	1.11	11
Because animals do not have to suffer.	2.91	1.36	14	2.90	1.24	15
Because it is natural (e.g., not genetically modified).	2.81	1.20	15	3.40	0.97	8
Because it would be impolite not to eat it.	2.79	1.20	16	2.21	1.12	17
Because it is low in calories.	2.68	1.27	17	2.90	1.12	15
Because I am sad.	2.66	1.30	18	1.87	1.10	19
Because others like it.	2.25	1.15	19	1.89	1.14	18

Note. N > 450 for all items (per group); participants indicated the importance of every food-choice motive on a 1-to-5 scale (no participant chose the option "I don't understand"); the ranking was formed separately for the generations based on their mean values: The food-choice motive with the highest mean importance is ranked 1, the one with the lowest mean importance is ranked 19. If two motives have the same mean, both are given the same rank.

planning when eating together as a family (overall $M_{\text{adults}} = 3.99$ vs. $M_{\text{adolescents}} = 3.39$) and more frequent influence than adolescents on every individual meal-planning step. Separately by generation, adolescents reported most frequently having an influence during grocery shopping and when planning a specific meal, their parents' generation when planning the groceries (see Table 2a).

3.7. EQ 2: Gender as an important factor

For the central outcome variables sustainability motive score, meat consumption, and overall advocating score, we found some notable differences in terms of gender and education: Women were more likely not to eat meat than men, especially among adolescents (adolescents: 24% women vs. 4% men; parents' generation: 7% women vs. 3% men) whereas men were more likely to always eat meat (adolescents: 4% women vs. 19% men; parents' generation: 3% women vs. 6% men). In addition, both adolescent women and women of their parents' generation reported more frequently advocating for sustainable family meal decisions than men ($M_{\text{adolescents}}$: 3.16 for women vs. 2.68 for men; M_{adults}: 3.3 for women vs. 2.98 for men). To account for these differences and the fact that our adolescent sample has a higher proportion of women, we additionally calculated all generational comparisons reported above with gender as a control variable; the results remain comparable with regard to size and direction. Descriptively, we also found a trend toward higher education being associated with never eating meat and more advocating for sustainable family meal decisions (see Fig. 3 for meat consumption; for sustainability food-choice motives and advocating, see Figs. S1 and S2 in the Supplemental Materials).

3.8. EQ 3: Importance of sustainable motives predict reported advocating

Exploratory analyses showed that sustainable motives are predictive for the overall advocating score ($\beta = 0.53$, $F(1,474) = 194.8$, $p < 0.001$, $R^2 = 0.29$, as well as for the general influence score on meal planning ($\beta = 0.27$), $F(1,430) = 36.07$, $p < 0.002$, $R^2 = 0.08$.

4. Discussion

This study explored generational differences in animal product consumption, food-choice motives, and advocating for sustainable family meal decisions. It also examined predictors of advocating for sustainable family meals in adolescents. The generations did not differ in overall meat consumption frequency, but adolescents more often reported clear-cut behaviors: Adolescents were about three times as likely not to eat meat but also twice as likely to eat meat daily compared to their parents' generation. Adolescents were more likely than their parents' generation to advocate for trying new plant-based substitutes at family meals and especially reported more advocating for sustainable family meals when they themselves engaged in less consumption of animal products and reported higher endorsement of sustainable food values.

Contrary to our hypotheses, there was no significant difference between the generations in importance of sustainability food-choice motives. One possible explanation is the item wording we used: Two out of three items addressed the environment more generally, not specifically climate change. Still, previous surveys also found higher endorsement of pro-climate attitudes and readiness-to-change among younger generations (Belz et al., 2022). Other aspects of environmental awareness (e.g., environmental attitudes, environmental behavior) were more important in their parents' generation (Belz et al., 2022). This indicates that "environmental motives" in themselves are a very broad concept in which certain aspects can be more important for one generation than another. To better understand the potential of adolescents and young adults as actors for future climate protection, research could differentiate aspects of environmental awareness that are relevant in the everyday lives of adolescents versus not.
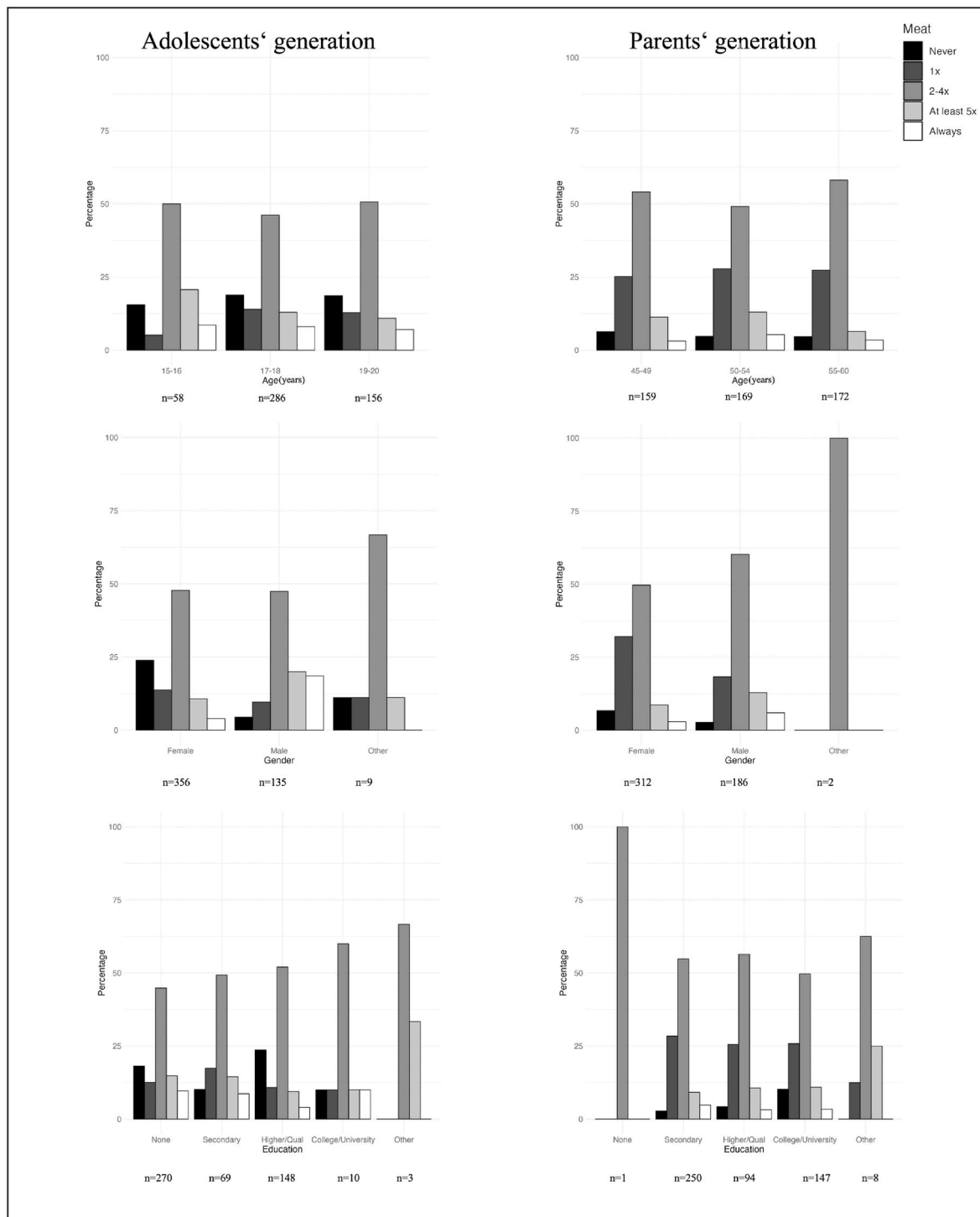
Fig. 3. Meat Consumption Patterns by Age, Gender, and Education
Note. For education, categories refer to highest qualification earned: None = no diploma/still in school; Secondary = high school diploma; Higher/Qual = high school diploma that qualifies for university entrance in Germany ('(Fach-)Abitur'); College/University = college or university degree. Numbers above bars are number of participants in each category.

Not finding significant mean differences in meat and other animal product consumption frequency between generations was unexpected. Importantly, substantial differences between the generations emerged when examining the distribution in meat consumption frequency: That over 18% of the adolescents reported not eating meat (compared to 5% in their parents' generation) is consistent with the high numbers of vegetarians and vegans in Germany in this age group (Heinrich-Böll-Stiftung & Bund für Umwelt und Naturschutz Deutschland (Hrsg.),

2021; Zühlsdorf et al., 2021). This suggests that young people are more likely to be represented at the ends of the scale and decide for or against meat consumption more decisively than their parents' generation, making the mean a less useful measure to explore consumption patterns. One explanation for this decisive choice of adolescents is that adolescence is a crucial phase for the development and change of social identity (Tanti et al., 2011). Having a vegetarian identity and belonging to this group is gaining importance (Nezlek & Forestell, 2020; Rosenfeld

et al., 2020). In summary, it is too simple to assume that young people on average consume animal products less or more often than their parents' generation. Further investigation of patterns and a closer look at underlying processes such as social identity could further advance our understanding of sustainable diets across generations.

Again, not supporting our hypotheses, adolescents were not more likely than their parents' generation to report advocating for less consumption of meat at shared meals - descriptively, it was the other way around with parents advocating more. One probable explanation is that they did so for health reasons: Eating a lot of meat (especially red meat) has many negative health consequences, including cardiovascular diseases and higher cancer risk (Wolk, 2017). Previous research showed that healthiness of the meal is important to parents (Russell et al., 2015; Søndergaard & Edelenbos, 2007)—which we also found in the current study ("healthy" as a food-choice motive ranked seventh for adolescents vs third for their parents' generation). Of note, participants of the parents' generation reported higher advocacy than adolescents on all advocating items—this merits further investigation to better understand whether this is a measurement issue, answer bias, or part of parents' role as nutritional gatekeepers.

As predicted, adolescents advocated more for eating less other animal products and trying plant-based substitutes at shared meals than adults of their parents' generation. This fits with previous research showing that children and adolescents are more likely to bring new products from outside into the family system (Ayadi & Bree, 2010; Williams et al., 2019) and that especially dairy substitutes are highly popular (Zühlsdorf et al., 2021). This finding is particularly interesting for future research and practice because it provides empirical evidence about the types of foods adolescents advocate for. Also, it shows what types they do not care about, potentially because they are less important for them, or because another family member is responsible for that aspect of the meal. Plant-based substitutes as a product parents feel less responsible for, as they consider plant-based substitutes for instance to be unhealthier, may be a lever for adolescents (Erhardt & Olsen, 2021). It is important to consider plant-based substitutes for meat in the context of sustainable diets. Although they do not classically reflect the planetary health diet (Willett et al., 2019), their increased consumption may reduce the overall consumption of animal products eaten in the family.

Adolescents who reported less consumption of animal products themselves also advocated for more sustainable food choices. We found an even stronger predictive effect for sustainable food values on family meal planning. These findings are in line with previous work showing that adolescents have a personal motivation to bring their own values into the family (Olsen & Ruiz, 2008). Interestingly, participants' own behavior—the consumption of animal products—had no predictive effect at all on their reported influence on general meal planning, whereas sustainability food-choice motives did. One explanation for this finding is that there may be other reasons for reduced meat consumption beyond sustainability (e.g., health, taste) that do not cause such a strong need for advocating, weakening the effect. Another explanation is that strong importance of sustainable food values may lead adolescents to attempt to influence family meal planning in line with these values, whereas their eating behavior itself may differ from these values, for instance, to compromise with their families to avoid conflicts.

4.1. Strengths, limitations, and future research

This study specifically compared adolescents and their parents' generation regarding their sustainability food-choice motives, consumption of animal products, and corresponding behaviors such as advocating for and influencing more sustainable family meals in a large, diverse sample. Our research question focused on generational differences and overarching patterns rather than on specific families, which needs to be considered when interpreting the data. Two further methodological aspects are worth noting: First, we restricted the number of additional control variables in the models. Although we compared

differences between age, gender, and education descriptively and tested all generational comparisons again while controlling for gender, we did not control for age and education. For one, no striking differences were found for age and—even more important—half of the adolescents had not finished school yet, which made educational comparisons of little informative value. In addition, we wanted to keep the statistical models as simple as possible. We did not assess other potentially interesting variables such as political attitudes. Given the broad sampling strategy of the access panel we used, we expected diverse political views to be represented in the sample. Second, we measured diet style in categories (never, 1x a week, 2–4x a week, etc.) and not linearly (e.g., on how many days of the week do you eat meat?). This has advantages and disadvantages: When asking participants to report their eating behavior as the number of days per week, statistical methods that require a metric scale level could be used. At the same time, respondents often have problems differentiating whether they eat different foods five or six times a week (Egele et al., 2023); therefore using categories as in the current study can lead to more precise answers. We also found that for the prediction of advocacy frequency, three categories for the consumption of meat (never, sometimes, often) and two for consuming other animal products (sometimes, often) were enough. A more fine-grained measurement would not have provided additional information to predict frequency of advocacy.

The same applies to the fact that we did not measure the quantity of meat consumption, but the frequency. It is very challenging for participants to retrospectively add up the quantity of various meat products (e. g., sausage, steak, ham cubes) over a period of time, because they need to both, remember all instances of eating meat and be able to estimate the amount on their plates which is generally difficult, but especially for dishes such as soups or stews, or when eating out. To measure the quantity somewhat reliably, at least an experience sampling design would be required, which would go beyond the aims of the current survey. Measuring the frequency can only be a proxy for quantity, this needs to be taken into consideration when interpreting the results.

4.2. Conclusion

Adolescents do not on average eat more sustainably than their parents' generation, but they are more likely to make clear-cut choices such as becoming vegetarian. Adolescents for whom sustainability food-choice motives are important advocate for them at shared meals; they also bring new plant-based products to family meals. Shared family meals provide adolescents the opportunity to become agents of change and in a reverse socialization process contribute to more sustainable and healthy family diets.

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CRediT authorship contribution statement

Vanessa Knobl: Writing – original draft, Visualization, Methodology, Formal analysis, Conceptualization. **Jutta Mata:** Writing – review & editing, Validation, Supervision, Project administration, Methodology, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

I have shared the link to the data in the manuscript and the Attach file step

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.appet.2024.107618.

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