

## Two forks, one meal: Health implications of shared food systems in couples

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### ABSTRACT

Eating together is central to daily life in romantic couples, and food choices are often shared rather than individual. We examined the interdependence in shared food systems of romantic couples with a focus on shared meal frequency and meat consumption similarity. We investigate how shared food systems affect health and how these effects are moderated by gender and couple gender composition (different-vs. same-gender couples). This preregistered study used data from Wave 3B (autumn 2023) of the German FReDA panel (representative of 18- to 49-year-olds). Participants ( $N = 12,686$ ) and their romantic partners ( $N = 5276$ ) were surveyed. Measures included frequency of shared meals with the partner, meat consumption, several health outcomes, gender, and cohabitation status. Couples frequently shared meals (on average 10.23 times/week) and had similar meat consumption ( $r = 0.48, p < .001$ ), particularly if they cohabited. More shared meals were associated with higher similarity and relationship satisfaction, higher life satisfaction, fewer depressive symptoms, and better subjective health, but also with higher meat consumption. No significant association with BMI was found. In heterosexual couples, gender moderated the effect on meat—shared meals associate to higher meat consumption for women but not men—but not the effects on subjective health or BMI. No gender moderations were found in homosexual couples. Findings highlight the importance of including romantic partners in models and interventions targeting eating behavior. Shared meals affect food choices (with gendered patterns) and can promote social and mental health, underlining the broad relevance of social eating.

More than a biological necessity, eating is a vital part of daily social life. Most meals are not eaten alone but with others (Yates & Warde, 2017). Yet, the role of people's eating companions has been largely neglected in psychological research (e.g., Rhodes & Beauchamp, 2024). Although this area is receiving increasing attention, the focus has mainly remained on family meals and children's health (van der Heijden & Wiggins, 2024). We have addressed this gap by describing the interdependence within shared food systems of romantic couples, its effects on various adult health outcomes, and how these effects differ by gender and couple gender composition.

### 1. Interdependence in “shared food systems” of romantic couples

Our notion of *shared food systems* builds on transactive goal dynamics theory (Fitzsimons & Finkel, 2018), the dyadic health influence model (Huelsnitz et al., 2022), and empirical work on merging individual food systems into a shared system as well as on jointly constructed food

choices (Baer et al., 2021; Bove et al., 2003). We define shared food systems as having some degree of interdependence in eating behavior between two or more specific people. This means that meals are planned, prepared, or eaten together with these people regularly. In shared food systems, eating decisions are often made jointly—shaped by and made on behalf of the shared food system. The degree of interdependence in a shared food system can vary, affected by motivation and opportunity (Fitzsimons & Finkel, 2018).

We focused on two aspects of interdependence: the frequency of shared main meals (i.e., breakfast, lunch, and dinner) and the similarity in food choice. These should be positively associated, as shared meals typically involve eating the same food (Veen et al., 2023), and similar food preferences likely facilitate more frequent shared meals. Yet, they are not completely correlated: People may eat together while consuming different foods or eat the same foods but at different times (Bove et al., 2003; Veen et al., 2023). People in shared food systems may affect each other's diets beyond shared meals, for example, through food availability at home or by changing each other's cognitions (Huelsnitz et al.,

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2022), or by situational social influences (Schüiz et al., 2018). Additionally, similarity in food preferences can evolve through homophilic selection—the tendency to start relationships with people who already prefer similar diets (Adamczyk et al., 2024).

We focused on shared food systems in romantic couples because partners are the main eating companions of adults (Mötteli et al., 2017), and sharing meals, especially dinner, is central to daily couple life (Bove et al., 2003). Given their closeness and shared resources, romantic couples have a particular influence on each other's health behaviors (Huelsnitz et al., 2022) and show the highest similarity in eating behavior of all relationship types (Pachucki et al., 2011). We operationalized similarity in food preferences as *meat consumption similarity*. Meat is an especially social food: It is consumed more often when eating with others than when eating alone (Wensing et al., 2024), is a source of social conflict (Markowski & Roxburgh, 2019), and is relevant to social identities, including gender—making it especially contested in (heterosexual) couples (Sobal, 2005). Further, meat reduction is highly relevant to health and sustainability (Willett et al., 2019). In Germany, the average intake is 53 kg per person per year (Federal Office for Agriculture and Food, 2025), vastly exceeding the recommended 16 kg (Willett et al., 2019).

In research on shared meals, definitions of eating companions (e.g., parent-child dyads, whole families, any other person) vary widely but most studies have focused on family meals (van der Heijden & Wiggins, 2024). Meals shared specifically with romantic partners are a topic in some qualitative but few quantitative studies. When studies distinguish between eating companions, partners are often not a separate category (e.g., Dunbar, 2017). This is an important research gap, as meals shared with one's partner likely differ in frequency, power dynamics, gender roles, and health priorities from meals shared with children (e.g., healthiness vs. hedonism; cf. Fulkerson et al., 2014) or other people, which often involve “eating out” and “treating oneself” beyond the usual everyday diet (Biermann & Rau, 2020). Couples' eating interdependence likely depends on various factors, including cohabitation: The home is a central food environment (Biermann & Rau, 2020). In qualitative studies, couples reported higher eating interdependence after moving in together (Bove et al., 2003). Couples shared about 71 % of dinners after getting married and moving in together versus about 25 % before (Marshall & Anderson, 2002). Moving in with a partner—a drastic change in daily social context—changed eating and body weight more than marriage (Mata et al., 2018).

## 2. Health outcomes of shared food system interdependence

Shared food systems affect not only eating but also social, mental, and physical health in various ways: van der Heijden and Wiggins (2024) criticized in their review that shared meals are often pictured only positively. While this holds true for children and adolescents across various health outcomes and genders (Dallacker et al., 2018; Glanz et al., 2021), adult eating interdependence might have both costs and benefits, varying by health outcomes and gender. As previous research has primarily examined shared meal frequency but not food choice similarity as an indicator of interdependence, our hypotheses primarily used shared meal frequency as predictor. We explored whether food choice similarity adds predictive power. Only for relationship satisfaction as outcome have we proposed hypotheses for both measures of interdependence.

**Relationship satisfaction (social health).** Shared meals increase trust, social connectivity, and feelings of closeness (Dunbar, 2017; Woolley & Lim, 2023) and couples engaging in shared health behaviors report higher relationship satisfaction (Wilson & Novak, 2022). Higher similarity in meat consumption in a couple should also be positively associated with relationship satisfaction, as different food preferences, often around meat, lead to food conflicts (Bove et al., 2003). As meat consumption or avoidance is linked to moral and political values (Grünhage & Reuter, 2021), meat consumption similarity could also

reduce conflicts in other domains. Eating the same (vs. different) food also increases trust and cooperation among eating companions (Woolley & Lim, 2023).

**Mental health.** Shared meals are consistently linked to positive mental health also in adults, including happiness, life satisfaction, fewer depressive symptoms, and higher social connectedness (Berge et al., 2024; Dunbar, 2017). We extended this research to romantic partners.

**Food choice.** Interdependence in shared food systems affects individual eating not only through convergence (Baer et al., 2021) but also because shared meals have cultural connotations and expectations. While snacking for main meals is common when eating alone, people reported cooking more “proper meals” for shared meals with their partner, which are often socially expected to include meat (Marshall & Anderson, 2002; Sobal, 2005). Quantitative studies have shown that commensality is associated with higher meat consumption with family members and nonfamily companions (Biermann & Rau, 2020) and moving in with a partner increases processed meat consumption (Hartmann et al., 2014).

**Physical health.** Evidence on the effects of shared meal frequency on adults' physical health is mixed: Some studies found small benefits for dietary quality (Rah et al., 2019) but evidence on weight is very weak (Fulkerson et al., 2014). Cohabitation is often linked to negative health outcomes (Mata et al., 2018), though shared meals are rarely empirically tested as a mechanism. Negative health effects may stem from prioritizing indulgence over health when eating with close others (Cummings & Tomiyama, 2019), higher meat consumption (Wensing et al., 2024), higher calorie intake through social facilitation (Herman, 2015), or convergence in diet harming the partner with previously healthier nutrition (Bove et al., 2003). One explanation for these mixed findings might be previous vague definitions of eating companions, which we therefore have specified as romantic partners. Another might be moderating effects by gender and couple gender composition.

## 3. Moderation of health effects by gender and couple gender composition

We argue that frequent shared meals and resulting convergence in eating habits likely affect men and women differently: On average, women eat more healthfully than men (e.g., more vegetables, less meat; Feraco et al., 2024). Eating with others is associated positively with men's and negatively with women's diet quality (Pachucki et al., 2018), and women cohabiting with their partner eat more meat and men less meat compared to those living alone (Hartmann et al., 2014). Women reported feeling limited in their food choice by their husbands' desire for meat, low food variety, and few vegetables (Brown & Miller, 2002; Sobal, 2005).

In heterosexual couples, shared meals should thus be less beneficial for women's health and food choice than for men's. In homosexual couples, there should be no such systematic differences in the effect for men and women, as the partners have the same gender. Comparing both types helps separate general effects of shared meals for men and women from the gender of their eating companion. While we acknowledge that more than two genders exist, diverse gender identities were not included in our hypotheses because of low sample size, limited literature, and large variety in couple gender compositions. But we report descriptives for this group to provide initial insights.

## 4. Summary of research gap, research questions, and hypotheses

This preregistered study addresses key research gaps: We clearly define shared meals as those with romantic partners, allowing precise estimates of prevalence and impact on adult health. We more comprehensively captured shared food systems by including similarity in meat consumption as a second quantitative operationalization of interdependence in addition to shared meal frequency. We explicitly compared gender moderations in hetero- and homosexual couples, which might

explain previous mixed findings. Using recent, large, representative panel data, we provide robust descriptive statistics. The research questions (RQs) and hypotheses (Hs) are listed below and illustrated in Fig. 1. All references to shared food systems, shared meals, and similarity pertain to romantic couples. Additional descriptive subgroup analyses are reported to contextualize findings.

**RQ1:** How interdependent are shared food systems of couples with different cohabitation status?

**H1.** Couples are similar in their meat consumption.

**H2.** Couples who share more meals are more similar in their meat consumption.

**H3.** Couples cohabiting (> partially cohabiting > not cohabiting) share more meals (a) and are more similar in their meat consumption (b).

**RQ2:** How is shared food system interdependence related to different health outcomes?

**H4.** (a) More shared meals and (b) higher meat consumption similarity predict higher relationship satisfaction.

**H5.** More shared meals predict more positive mental health outcomes, specifically, (a) higher life satisfaction and (b) lower depressive symptoms.

**H6.** More shared meals predict higher meat consumption.

**H7.** More shared meals predict physical health outcomes, specifically,

(a) subjective health and (b) body mass index (BMI; non-directed hypothesis due to mixed findings in literature).

**RQ3:** Do shared food systems affect men's and women's health differently, and how does this differ between homo- and heterosexual relationships?

**H8.** In heterosexual couples, gender moderates the effects of shared meals on physical health and meat consumption outcomes, such that shared meals are less beneficial for women than for men, specifically regarding (a) meat consumption, (b) subjective health, and (c) BMI.

**H9.** In homosexual couples, gender does not moderate the effects of shared meals on physical health and meat consumption, specifically regarding (a) meat consumption, (b) subjective health, and (c) BMI.

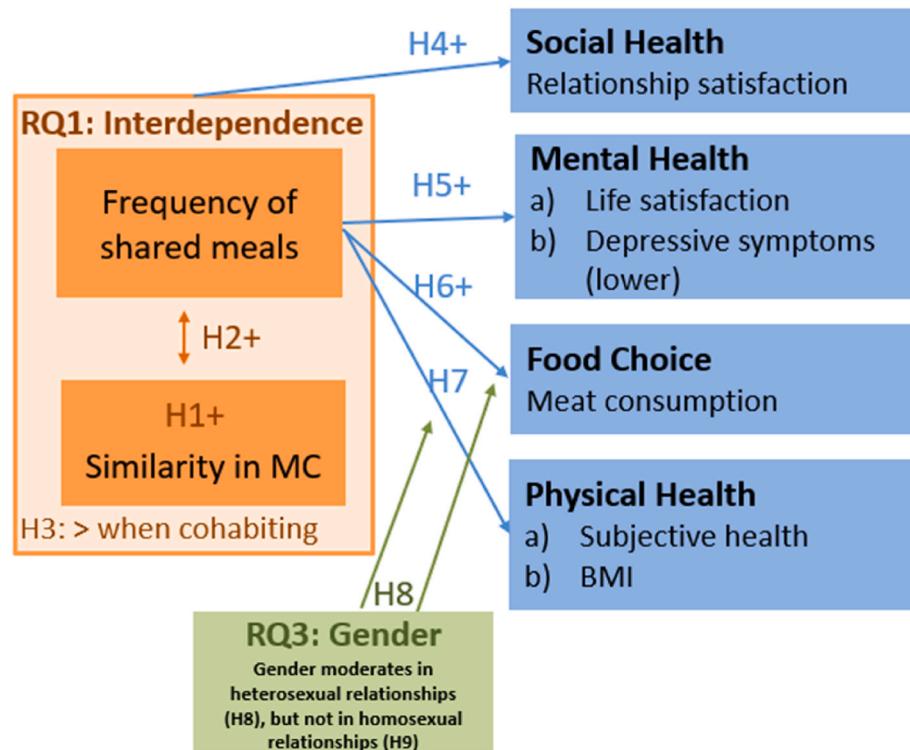
## 5. Methods

### 5.1. Transparency and openness

Research questions, hypotheses, exclusion criteria, relevant measures and transformations, analysis methods, and inference criteria were preregistered prior to data access ([osf.io/z2w6u](https://osf.io/z2w6u)) and are reported. Minor deviations from the preregistration are reported in Supplement A1. Data documentation is publicly available; data can be requested free of charge (<https://www.freda-panel.de/FReDA/EN/Publications/Data-Documentation/Data-Documentation.html>). Data were analyzed using R version 4.5.0 (R Core Team, 2025); all R scripts are publicly available ([osf.io/tm93k](https://osf.io/tm93k)).

No additional ethical approval was required, as the FReDA panel operates under GDPR compliance, ensures anonymity, and for which informed consent was obtained from all participants. Analyses were

## RQ2: Facets of Health



**Fig. 1.** Overview of the Theoretical Model, Research Questions, and Hypotheses. Note. A plus sign indicates an expected positive effect. BMI = Body mass index; H = hypothesis; MC = meat consumption; RQ = research question.

conducted on anonymized data.

## 5.2. Data and sample characteristics

We used data of the German Family Research and Demographic Analysis (FReDA) panel from release v.5.0.0 (Bujard et al., 2025; Hank et al., 2025; Schneider et al., 2021), a longitudinal panel study on romantic couples and families. Starting in 2020, the anchor sample of the FReDA-Generations and Gender Survey (GGS) was sampled to be representative of 18- to 49-year-olds in Germany, using population registers of selected municipalities (for further information on sampling

strategy, see (Bujard et al., 2025). Romantic partners of the anchor participants are also surveyed, allowing dyadic analyses. The survey consists of a standardized questionnaire that is administered once a year, divided into a spring and an autumn wave. Participants can choose whether to complete the questionnaire online (web-based) or via paper-and-pencil. For our study, we used cross-sectional data of the FReDA-GGS sample from Wave (W) 3B, collected in fall 2023. Observations were excluded following the preregistered exclusion criteria (also in case of missing values on these criteria): not in a romantic relationship, no partner data in W3B (only for dyadic analyses including similarity), diverse gender identity of anchor or partner, cases flagged

**Table 1**  
Sample description.

Characteristic	Subgroup/details for characteristic	German target population, Wave 1, 2020 <sup>a</sup>	Representativeness comparison		Main dataset for analyses	Complete dyads dataset (for analyses with dyadic variables)	
			Anchor sample of FReDA-GGS panel, wave 3B, 2023 <sup>b</sup>	Anchor sample		Anchor sample	Partner sample
<i>N</i>							
Current relationship status	1. Currently single 2. Currently in romantic relationship 3. NA	NI NI	16,742 22.35 77.60	12,686 <i>Excluded</i> 100	5276 <i>Excluded</i> 100	5276 <i>Excluded</i> 100	5276 <i>See anchor sample</i>
Couple gender composition (if in relationship)	1. Heterosexual relationship 2. Homosexual relationship 3. Relationship with at least one gender-diverse partner 4. Unclear (at least one gender missing)	NI	0.05 94.78 2.86 0.21	<i>Excluded</i> 97.07 2.93 <i>Excluded</i>	<i>Excluded</i> 96.76 3.24 <i>Excluded</i>	<i>Excluded</i> See anchor sample	
Gender	1. Male 2. Female 3. Diverse 4. NA	50.97 49.03 NI NI	43.84 55.90 0.25 0.01	42.20 57.80 <i>Excluded</i> <i>Excluded</i>	48.26 51.74 <i>Excluded</i> <i>Excluded</i>	51.65 48.35 <i>Excluded</i> <i>Excluded</i>	
Age	1. 18–19 years 2. 20–24 years 3. 25–29 years 4. 30–34 years 5. 35–39 years 6. 40–44 years 7. 45–49 years 8. 50–55 years (remain in sample) 9. NA	4.93 14.03 15.04 17.80 16.24 15.82 16.15 NI	10.69 14.02 16.65 18.10 17.33 14.66 8.54	/ 12.14 1 7.25 19.69 19.02 15.64 9.32	/ 6.93 13.38 20.20 21.65 18.50 13.31 6.92	/ 6.03 13.38 20.47 22.18 16.87 10.60 7.47	0.21 5.50 13.80 20.47 22.18 16.87 10.60 7.47
Educational level	1. Low (ISCED levels 0–2) <sup>c</sup> 2. Medium (ISCED levels 3 & 4) 3. High (ISCED levels 5–8) 4. NA	17.49 53.72 28.79 NI	2.77 41.60 51.88 3.76	2.00 39.10 55.26 3.64	1.63 36.43 58.68 3.26	1.63 36.71 58.15 3.51	
Employment status	1. Employed 2. Unemployed 3. Outside the labor force 4. NA	79.43 3.68 16.88 NI	77.87 1.64 19.11 1.39	80.99 1.25 16.56 1.20	80.12 1.16 17.74 0.99	80.06 1.33 17.53 0.08	
Migration background <sup>d</sup>	1. Born in G & G citizenship 2. Born in G & no G citizenship 3. Not born in G & no G citizenship 4. Not born in G & G citizenship 5. NA	74.14 2.77 16.08 7.01 NI	89.37 0.89 3.91 5.26 0.57	89.15 0.86 3.97 5.49 0.54	90.14 0.63 3.73 4.89 0.61	85.42 0.61 5.04 4.51 4.42	
Marriage/civ. part. status	1. Never married 2. Married/civ.part. 3. Divorced/dissolved CP. 4. Widowed/surviving partner of CP 5. NA	52.90 40.67 6.12 0.31 NI	42.95 48.25 4.02 0.20 4.58	31.52 61.76 3.26 0.07 3.38	29.42 66.19 2.39 0.09 1.91		NI

*Note.* All numbers (except sample sizes) are percentages. NAs (missing values) on variables are counted as own categories to give percentages corresponding to subsample sizes. G = German/Germany; NI = no information available; CP = registered civil partnership. FReDA-GGS = German Family Research and Demographic Analysis-Generations and Gender Survey.

<sup>a</sup> Information about target population from 2020 (aged 18–49) for anchors, provided in FReDA data manual.

<sup>b</sup> Sample weights are available for this sample (full FReDA GGS sample) at wave 1. The table shows sample composition at wave 3B (cleaned by flag variables also used for our analyses datasets but no other exclusion criteria applied).

<sup>c</sup> ISCED refers to International Standard Classification of Education (ISCED) 2011 levels (level 0 was included in category low education in the FReDA samples).

<sup>d</sup> Migration background: Race and ethnicity were not assessed in this study or in official census data in Germany because of historical and legal sensitivities. Instead, immigration history was used as a proxy to capture aspects of ethnic and cultural diversity. This approach follows common practice in European research contexts and reflects efforts to navigate the political and social complexities surrounding these constructs.

for inconsistencies or lower data quality from the panel (see preregistration and Supplement A1 for details). Table 1 shows sample characteristics for the reference population and different samples. Most analyses used information from anchors only ( $N = 12,686$ ). For analyses including partner meat consumption (e.g., meat consumption similarity), dyadic data from anchors and partners were needed (complete dyads  $N = 5276$ ). In the main analysis sample, 12,314 (97.07 %) anchors were in a heterosexual and 372 (2.93 %) in a homosexual relationship. Couples with at least one partner identifying as diverse gendered ( $N = 27$ ) were excluded from both analysis samples but included in gendered subgroup descriptive analyses. In the main analysis sample, couples had been in their current relationship for an average of 12.26 years ( $SD = 8.28$ ), and the mean age of anchors was 37.74 years ( $SD = 8.38$ ).

### 5.3. Measures and transformations

All variables were assessed in German, primarily from the anchor person unless noted otherwise (see official data documentation of the FReDA-panel linked above) for sociodemographic measures and references of the measures) and were extensively pretested by survey specialists. *Shared meal frequency* was assessed by asking how many days per week participants typically shared breakfast, lunch, and dinner with their partner, across all settings (home/away, weekdays/weekends). Responses ranged from 0 to 7 per mealtime. For hypothesis testing, we summed all mealtime answers into a total score; descriptives also report meals separately. *Meat consumption frequency* was assessed in self-reports of both anchor and partners. Participants reported the number of meat-eating days per week (1–7), with additional options: (1) <1 day/week (coded as 0.5), (2) pescatarian, (3) vegetarian, and (4) vegan (2–5 coded as 0). For some analyses, we classified respondents as meat eaters ( $>0$  days/week) or non-meat eaters ( $=0$  days/week). *Meat consumption similarity* was calculated as the absolute difference between anchor and partner's individually self-reported meat consumption frequency. Higher difference values indicate lower similarity. *Relationship satisfaction* was assessed with a single item rating satisfaction with the relationship with their partner from 0 (*not at all satisfied*) to 10 (*completely satisfied*; taken from The German version of the Relationship Assessment Scale; Sander & Böcker, 1993). Overall momentary *life satisfaction* was measured with a single item rated from 0 (*not at all satisfied*) to 10 (*completely satisfied*; adapted from the German Socio-Economic Panel [SOEP]; Cheung and Lucas, 2014 show comparable validity of one item measures for life satisfaction). *Depressiveness* was assessed with the mean of three items on how often participants felt depressed, anxious, or sad in the past week from 1 (*never*) to 4 (*most or all the time*; 5-item short version of the 20-item Center for Epidemiologic Studies Depression [CES-D] scale; Radloff, 1977; Cronbach's alpha = 0.77.). *Subjective health* was measured with a single item on participants' perception of their overall health, rated from 1 (*very poor*) to 5 (*very good*; taken from the SF-12 and the SF-36 health measure; e.g. Bullinger & Kirchberger, 1998). *BMI* was calculated from self-reported weight (Wave 3B) and height (Wave 1B; height is considered stable in this age group). Analyses concerning the BMI variable include only participants with a BMI  $>25$ , the World Health Organization threshold for being overweight.

*Gender* was self-reported by both partners (male, female, diverse; the latter corresponding to the German legal and social category 'divers', including a range of non-cisgender identities); if partner data were missing, anchor reports of their partner's gender were used. Gender mismatches from anchor and partner reports were coded as missing ( $N = 14$ ). *Couple gender composition* was defined as follows: mixed-gender couples of men and women as heterosexual, same-gender couples (both men or both women) as homosexual. Couples with at least one partner with a diverse gender identity were excluded from main analyses. *Cohabitation status* was categorized as (1) permanently cohabiting, (2) partially cohabiting (with an additional separate household), (3) not cohabiting.

### 5.4. Statistical analyses

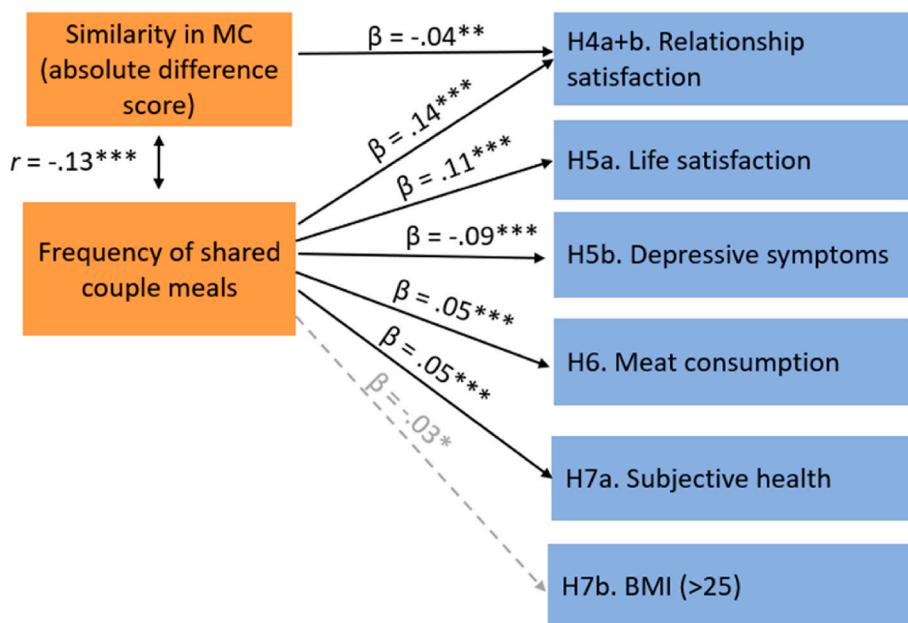
We prepared and analyzed the data as preregistered. Directed hypotheses were tested one-sided where appropriate; all other tests were two-sided,  $p$  values are labeled accordingly. We used a Bonferroni-corrected significance threshold of  $p < .01$  and report 99 % two-sided confidence intervals (CIs) for relevant estimates (also if a test was one-sided, to follow standard reporting practices; thus evaluation of significance is based on one-sided  $p$  values, not on CI overlap with zero). Missing data were handled via pairwise deletion (in non-structural equation models [SEMs]) or full information likelihood (in SEMs). Implausible values were omitted (see preregistration). Univariate outliers were detected by median absolute deviation  $>3$  (Leys et al., 2013), see Supplement B1. Reported results include outliers, main analyses were repeated excluding them as robustness checks. Sample weights were not used for hypothesis testing. Main descriptive results are reported unweighted (manuscript) and weighted (Supplement B2). Note, that applying the sample weights designed for the full FReDA-GGS sample to our nonrandom subgroup of interest might bias the weighted results.

Descriptive statistics for subgroups complement inferential analyses. Hypotheses were tested as follows (see also preregistration). **H1:** Three different indicators of partner similarity in meat consumption: (a) Pearson correlation (common variation in frequency), (b) intraclass correlation coefficient (ICC; absolute agreement in frequency), and (c) binary logistic regression predicting partner's meat-eating status (yes/no) from the anchor's (matching of categories). Tests a and b were repeated in meat eaters only for robustness. **H2:** Correlation between shared meal frequency and absolute difference score in meat consumption between partners. **H3:** Two linear regressions predicting (a) shared meal frequency and (b) meat consumption difference score from cohabitation status, with planned pairwise contrasts. **H4–H7:** A joint SEM with maximum likelihood estimation and full-information maximum likelihood for missing data handling. See Fig. 2 for model definition. Model fit was assessed using RMSEA ( $<0.06$ ), CFI/TLI ( $>0.95$ ), and SRMR ( $<0.08$ ). H8a-c was preregistered to be tested in a moderated SEM together in one joint model, but due to overfitting and several modification attempts not resulting in appropriate SEMs (see Supplement A1), H8 was tested using separate multiple regression models for each outcome. **H9:** was tested in the homosexual subsample using Bayesian SEM (Markov chain Monte Carlo estimation). A null model (no interaction effects) was compared to a model with interactions (alternative model) via Bayes factor ( $BF_{01}$ ), where  $BF_{01} > 1$  supports the null hypothesis (no moderation) and  $BF_{01} < 1$  supports the alternative (moderation).

## 6. Results

### 6.1. Descriptive results

Descriptives reported in the manuscript are unweighted to match the unweighted inferential analyses and because of limited interpretability of weights for our nonrandom subsample (see Supplement B2 for weighted descriptives). Supplement B3 shows descriptives and correlations of main variables. Table 2 shows shared food system interdependence indicators stratified by cohabitation status (RQ1). On average, couples shared 10.23 meals ( $SD = 4.31$ ) per week, corresponding to ~49 % of main meals (conservatively assuming 21 main meals per week). Dinner was most frequently shared, lunch least. Fully cohabiting couples shared meals almost twice as often ( $M = 10.94$ ) as non-cohabiting ones ( $M = 5.58$ ). Couples also showed high similarity in meat consumption, especially when cohabiting. Table 3 reports meat consumption frequencies by gender, relationship status, couple gender composition, and cohabitation status (RQ3), see Supplement B4 for subsample sizes. Women ate meat less frequently than men, especially among singles and noncohabiting couples. In heterosexual relationships,



**Fig. 2.** SEM for RQ2 (H4–H7): Shared Food System Interdependence Predicting Various Health Outcomes *Note*. Structural equation model (SEM). Reported estimates are standardized; see main text for more detailed results. Not specified but allowed covariances among the outcomes are not depicted for better readability of the figure. BMI = Body mass index; H = hypothesis; MC = meat consumption; RQ = research question. Black arrows indicate significant associations; gray dotted arrow indicates insignificant association (on our threshold of  $\alpha = .01$ ). \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

**Table 2**  
Descriptives of interdependence in shared food systems of couples stratified by cohabitation status.

Couple cohabitation status	N (anchors)	N (dyads)	Shared meals couple				Similarity in MC in couple			
			M (SD) of all shared meals	M (SD) of shared breakfasts	M (SD) of shared lunches	M (SD) of shared dinners	M (SD) of MC absolute difference score in couple	Correlation of MC anchor and partner ( $r$ , one-sided $p$ )	Correlation of MC anchor and partner in meat eaters only ( $r$ , one-sided $p$ )	% matched couples on meat-eater category <sup>a</sup>
All couples <sup>b</sup>	12,686	5276	10.23 (4.31)	2.58 (2.08)	2.36 (1.90)	5.44 (1.98)	1.66 (1.54)	$r = 0.48, p < .001$	$r = 0.38, p < .001$	89.2
Cohabiting couples	10,670	4806	10.94 (3.89)	2.73 (2.11)	2.50 (1.90)	5.86 (1.65)	1.63 (1.51)	$r = 0.50, p < .001$	$r = 0.39, p < .001$	89.8
Partially cohabiting couples	496	154	8.46 (4.18)	2.25 (1.76)	2.09 (1.86)	4.29 (1.97)	1.74 (1.65)	$r = 0.43, p < .001$	$r = 0.35, p < .001$	87.0
Noncohabiting couples	1496	312	5.58 (4.19)	1.58 (1.54)	1.42 (1.62)	2.74 (1.89)	2.12 (1.90)	$r = 0.29, p < .001$	$r = 0.19, p = .002$	79.8

*Note.* Both homo- and heterosexual couples are included here. N anchors is sample size for shared meal variables; N dyads is sample size for all similarity measures (as for these measures both partners needed to fill in the questionnaires). Ns for individual variables slightly differ owing to varying numbers of NAs. MC = Meat consumption, always given in days per week.

<sup>a</sup> % matched couples (both meat eaters or both non-meat eaters) of couples with complete data (missing values not counted).

<sup>b</sup> Row with “all couples” includes cases where cohabitation status is NA (24 in anchor sample, 4 in dyad sample), such that Ns do not perfectly add up. Reported correlations are Pearson correlations.

women's meat consumption varied more by cohabitation status ( $M_{\text{not cohabiting}} = 2.45$ ;  $M_{\text{cohabiting}} = 3.25$ ) than men's ( $M_{\text{not cohabiting}} = 4.09$ ;  $M_{\text{cohabiting}} = 4.28$ ). Notably, men in cohabiting heterosexual couples ate meat even slightly more frequently than single men or men in non-cohabiting heterosexual relationships. Descriptively, women and men in homosexual relationships ate less meat than in heterosexual relationships. Gender-diverse participants ate the least meat of all genders and contrasting to the trend in other genders, ate less meat when in a relationship than when single, but note the small Ns.

## 6.2. Hypothesis testing

H1 to H7 were tested in all subsamples jointly, H8 in the heterosexual, and H9 in the homosexual subsample only. H1: Three statistical

approaches were used to assess different aspects of similarity in meat consumption among partners: (a) As expected, a significant positive Pearson correlation indicated systematic covariation in partners' meat consumption frequencies,  $r = 0.48$ , one-sided  $p < .001$ , 99 % CI [0.45, 0.51]. (b) An ICC confirmed absolute agreement,  $ICC = 0.48$ , 99 % CI [0.46, 0.50], one-sided  $p < .001$ . (c) A logistic regression showed that anchors' meat-eating status significantly predicted their partners' meat-eating status,  $B = 2.67$ ,  $SE = 0.10$ ,  $z = 25.50$ , one-sided  $p < .001$ . Specifically, anchors who ate meat were about 14.51 times more likely to have partners who also ate meat, odds ratio = 14.51 ( $\exp(B)$ ), 99 % CI [11.08, 19.03]. Results were robust in both the full and the meat-eater-only subsamples, as well as across cohabitation subgroups (Table 2). H2: As expected, a significant negative Pearson correlation indicated that more shared meals were associated with greater similarity in meat

**Table 3**

Meat consumption frequency (Days/Week) stratified by gender, relationship status, relationship type, and cohabitation status.

Status	N valid MC reportings	MC overall M (SD)	MC men M (SD)	MC women M (SD)	MC diverse gender M (SD)	MC difference: men – women
Full sample	16,021	3.54 (2.24)	4.21 (2.14)	3.01 (2.16)	2.10 (2.38)	1.20
Singles	3626	3.33 (2.32)	4.14 (2.21)	2.52 (2.14)	2.33 (2.73)	1.62
All anchors in relationships	12,395	3.6 (2.21)	4.24 (2.11)	3.13 (2.15)	1.88 (2.04)	1.11
All anchors in heterosexual relationships	12,006	3.62 (2.20)	4.27 (2.10)	3.15 (2.15)	/	1.12
Cohabiting heterosexual couples	10,147	3.69 (2.17)	4.28 (2.09)	3.25 (2.13)	/	1.03
Partially cohabiting heterosexual couples	454	3.56 (2.21)	4.31 (2.09)	2.95 (2.11)	/	1.36
Not cohabiting heterosexual couples	1387	3.11 (2.31)	4.09 (2.17)	2.45 (2.17)	/	1.64
All anchors in homosexual relationships	362	3.13 (2.27)	3.58 (2.31)	2.6 (2.12)	/	0.98
Cohabiting homosexual couples	266	3.15 (2.24)	3.51 (2.32)	2.73 (2.08)	/	0.78
Partially cohabiting homosexual couples	31	3.81 (2.04)	4.3 (2.03)	2.91 (1.80)	/	1.39
Not cohabiting homosexual couples	64	2.77 (2.47)	3.44 (2.40)	2.02 (2.35)	/	1.42
Anchors in relationship incl. diverse gender identity <sup>a</sup>	27	2.43 (2.36)	<sup>b</sup>	<sup>b</sup>	1.88 (2.04)	<sup>b</sup>

Note. Participants with missing values on our exclusion criteria gender and relationship status were excluded here, ( $n = 10$  had valid values for meat consumption but not on these criteria), as missing values on these variables might indicate lower data quality due to inconsistencies. Missing values on cohabitation status were not excluded, such that the cohabitation category  $N$ s do not perfectly add up to their overall relationship category.  $N$ s of each individual cell of the table vary widely and can be found in Supplement B4. Descriptives for singles are also included as a reference point for how much meat people eat without the influence of a romantic partner. MC = Meat consumption.

<sup>a</sup> In the subsample of anchors being in a relationship where at least one partner has a diverse gender identity the sample sizes were too small for useful subgroups by cohabitation status.

<sup>b</sup> The subsamples of male and female anchors were too small for meaningful descriptives ( $N = 2$  for men and  $N = 4$  for women), such that we omitted these values from the table.

consumption (i.e., smaller absolute differences between partners),  $r = -0.12$ , one-sided  $p < .001$ , 99 % CI [-0.15, -0.08].

**H3:** See Table 2 for descriptives by cohabitation subgroups. H3a: A linear regression showed cohabitation significantly predicted the frequency of shared meals in couples,  $F(2, 12,515) = 1227.00$ , two-sided  $p$  (for  $F$  test)  $< 0.001$ ,  $R^2 = 0.16$ . Planned pairwise contrasts revealed that fully cohabiting couples shared significantly more meals than both noncohabiting (estimate = 5.36, one-sided  $p < .001$ , 99 % CI [5.08, 5.65]) and partially cohabiting (estimate = 2.48, one-sided  $p < .001$ , 99 % CI [2.00, 2.95]) couples. Partially cohabiting couples shared significantly more meals than noncohabiting couples (estimate = 2.89, one-sided  $p < .001$ , 99 % CI [2.35, 3.42]). All contrasts and the overall model thus support H3a. H3b: An analogous regression model predicting similarity in meat consumption also yielded a significant overall model,  $F(2, 5269) = 15.19$ , two-sided  $p < .001$  (for  $F$  test);  $R^2 = 0.006$ . Fully cohabiting couples were more similar in their meat consumption than noncohabiting (estimate = -0.49, one-sided  $p < .001$ , 99 % CI [-0.72, -0.26]) and partially cohabiting (estimate = -0.38, one-sided  $p = .006$ , 99 % CI [-0.77, 0.01]) couples. The difference between fully and partially cohabiting couples was in the expected direction but not significant (estimate = -0.11, one-sided  $p = .191$ , 99 % CI [-0.43, 0.21]). Two of three contrasts and the overall model thus support H3b.

**H4–H7:** A SEM was specified as preregistered to examine the associations between shared meals, meat consumption similarity, and health outcomes. The model demonstrated excellent fit: RMSEA = 0.011, CFI = 0.999, TLI = 0.996, SRMR = 0.008. Coefficients reflect unstandardized ( $B$ ) and standardized ( $\beta$ ) estimates; see Fig. 2 for a graphical overview. H4a: As predicted, higher shared meal frequency significantly predicted higher relationship satisfaction ( $B = 0.06$ ,  $SE = 0.004$ , 99 % CI [0.05, 0.07], one-sided  $p < .001$ ;  $\beta = 0.14$ ). In line with H4b, higher meat consumption similarity in the couple (i.e., a lower difference score) was associated with higher relationship satisfaction ( $B = -0.05$ ,  $SE = 0.014$ , 99 % CI [-0.08, -0.01], one-sided  $p = .001$ ;  $\beta = -0.04$ ). H5a: As expected, more shared meals predicted greater life satisfaction ( $B = 0.04$ ,  $SE = 0.003$ , 99 % CI [0.03, 0.05], one-sided  $p < .001$ ;  $\beta = 0.11$ ). Consistent with H5b, more shared meals predicted lower depressive symptoms ( $B = -0.01$ ,  $SE = 0.001$ , 99 % CI [-0.02, -0.01], one-sided  $p < .001$ ;  $\beta = -0.09$ ). H6: As expected, more shared meals predicted higher meat consumption ( $B = 0.02$ ,  $SE = 0.005$ , 99 % CI [0.01, 0.04], one-sided  $p < .001$ ;  $\beta = 0.05$ ). Note the significant moderation effect of

gender for this effect (see H8a). H7a: As expected, more shared meals predicted higher subjective health ( $B = 0.01$ ,  $SE = 0.002$ , 99 % CI [0.01, 0.01], two-sided  $p < .001$ ;  $\beta = 0.05$ ). H7b: For BMI among overweight participants, the effect of shared meal frequency on BMI was negative but not statistically significant at  $\alpha = .01$  ( $B = -0.04$ ,  $SE = 0.01$ , 99 % CI [-0.07, 0.00], two-sided  $p = .011$ ;  $\beta = -0.03$ ). Exploratively, we tested whether similarity would add predictive power by adding the respective paths in the SEM. For none of the other physical and mental health outcomes (other than relationship satisfaction in H4b) was this the case; see Supplement B5.

**H8:** We ran three separate multiple linear regressions (one per outcome) in the heterosexual subsample, each including shared meal frequency, gender (0 = male, 1 = female), and their interaction. Full regression model tables are in Supplement B6 (heterosexual subsample; see Supplement B7 for explorative models in the homosexual subsample), simple slopes plots are in Supplement B8. H8a: The interaction between shared meal frequency and gender predicted meat consumption frequency ( $\beta = 0.13$ ,  $b = 0.05$ , 99 % CI [0.03, 0.07],  $SE = 0.01$ , one-sided  $p < .001$ ), supporting H8a. This indicates that the association between shared meals and meat consumption varies by gender: A simple slopes analysis showed that among women, more shared meals were associated with higher meat consumption frequency ( $\beta = 0.07$ ,  $b = 0.04$ ,  $SE = 0.006$ , 99 % CI [0.01, 0.06], one-sided  $p < .001$ ). Among men, this association was not significant at  $\alpha = .01$  ( $\beta = -0.03$ ,  $b = -0.01$ ,  $SE = 0.007$ , 99 % CI [-0.06, 0.01], one-sided  $p = .027$ ). H8b: The interaction between shared meal frequency and gender did not predict subjective health ( $\beta = 0.00$ ,  $b = 0.00$ ,  $SE = 0.004$ , 99 % CI [-0.01, 0.01], two-sided  $p = .944$ ), not supporting H8b. H8c: There was no interaction between shared meal frequency and gender in predicting BMI in the overweight subsample ( $\beta = -0.01$ ,  $b = -0.01$ ,  $SE = 0.029$ , 99 % CI [-0.09, 0.06], two-sided  $p = .760$ ), not supporting H8c.

**H9:** A multivariate Bayesian model including Gender  $\times$  Shared Meal Frequency interactions across all three H9 outcomes was compared to a main-effects-only model in the homosexual subsample. The BF (0.015) indicated that the data were about 67 times more likely under the model without interactions. This constitutes strong evidence in favor of H9, supporting the absence of gender-specific effects of shared meals on the three health outcomes in homosexual couples. Results for three separate models (analogously to H8) also supported H9 with BFs  $< 1$  (H9a: 0.197; H9b: 0.051; H9c: 0.998) though evidence was weaker (i.e., BFs closer to

1) than in the joint model. Particularly for **H9c**, the near-equal likelihood of interaction and noninteraction models ( $BF \approx 1$ ) likely reflects the small sample of overweight participants in homosexual relationships ( $n = 156$ ).

### 6.3. Robustness checks

To test the robustness of our results, we first excluded univariate outliers (Supplement B1). Most results were robust when outliers were excluded, except for **H3b** and **H7b**, which were both (partially narrowly) not significant (Supplement B9), possibly owing to outlier exclusion strongly reducing the range of values on the relevant variables for these two hypotheses. Second, adding age and education level of the anchor did not affect results relevantly (Supplement B9). Gender was not controlled because our two main predictors (shared meals and similarity among partners) are dyadic, which in heterosexual couples (most couples in this sample) inherently include both binary genders. For **H8** and **H9** gender is explicitly investigated as a moderation variable.

## 7. Discussion

### 7.1. Summary of findings

We investigated interdependence in shared food systems of romantic couples. Couples frequently shared meals (about 10 main meals/week) and were highly similar in their meat consumption. The more frequently meals were shared, the more similar their meat consumption. Cohabiting couples were more interdependent in their eating than non-cohabiting couples. This interdependence was consistently related to positive social and mental health: More shared meals and higher similarity were associated with higher relationship satisfaction. Shared meals were further linked to higher life satisfaction and lower depressive symptoms. Links between shared meals and food choice and physical health outcomes, however, were mixed: Sharing more meals was associated with better subjective health, but also with higher meat consumption. The small, negative effect on BMI (in the overweight subsample) narrowly did not reach significance. In heterosexual couples, sharing more meals was associated with increased meat consumption in women but not in men; no gender differences emerged on subjective health or BMI. As expected, in homosexual couples, gender did not moderate associations of shared meals with meat consumption, subjective health, or BMI. Taken together, sharing meals with one's partner was reliably linked to higher relational and psychological well-being, while associations with physical health outcomes and meat consumption were smaller and more selective depending on specific outcomes and subgroups.

### 7.2. Interpretation of findings

Our findings support and extend previous research in several important ways. First, the high interdependence in shared food systems—particularly among cohabiting couples—corroborates earlier mostly qualitative studies on shared meals of couples (e.g., [Bove et al., 2003](#)) and the strong similarity in meat consumption aligns with prior evidence regarding concordant diets in couples ([Pachucki et al., 2011](#)). Our study contributes highly detailed quantitative data on shared meals among couples and comprehensive measures of dietary similarity—stratified by cohabitation subgroups and couple gender composition. The new finding, that dietary similarity increases with more shared meals and cohabitation, suggests convergence effects, rather than solely initial selection effects.

The positive associations between shared couple meals with relationship satisfaction, life satisfaction, and reduced depressiveness mirror findings from studies on family or general shared meals without clearly specified eating companions ([Berge et al., 2024; Dunbar, 2017](#)) and extend them to meals of romantic couples—an understudied group in

this context even though romantic partners are the main eating companions of adults ([Mötteli et al., 2017](#)). Despite modest effect sizes, these observed effects are important given the multifactorial nature of these health outcomes—underlining that shared eating plays a measurable role in psychosocial health dynamics within relationships. Our findings fit well with the general picture that physical health outcomes of shared meals for adults are more mixed: We found a small positive relation to subjective health, but no association with BMI in the overweight sample. Notably, more shared meals were associated with higher meat consumption—often a negative health behavior considering meat consumption levels are already high—supporting prior studies linking commensality and increased meat consumption ([Biermann & Rau, 2020](#)) with findings from a large, representative dataset and focusing on couples.

Large datasets with dyadic data on healthy eating in romantic relationships are rare in heterosexual couples and largely absent for homosexual couples. In heterosexual couples, shared meals increased women's meat consumption but not men's, suggesting asymmetric dietary convergence toward men's higher meat preferences, which was previously reported qualitatively ([Sobal, 2005](#)). Yet, this contrasts with findings that women are considered the stronger influence on couple eating ([Baer et al., 2021](#)). The prioritization of men's preferences is particularly notable given that women still cook more but is in line with reports on women feeling pressured to cook meals that satisfy their partner's (or children's) tastes ([van der Heijden & Wiggins, 2024](#)). Considering that women, on average, follow healthier diets ([Feraco et al., 2024](#)), this pattern may hinder social change toward healthier and more sustainable eating. This gender moderation was absent in homosexual couples, meaning that women do not generally eat more meat when they share more meals with their partner, but only if their partner is a man. This suggests that these dynamics are shaped less by gender itself than by patriarchal structures organizing gender relations. According to [West and Zimmerman's \(1987\)](#) idea of gender as something enacted in daily life, shared routines like eating together as a couple can reproduce broader societal gender hierarchies. In heterosexual couples, food may serve as a site for performing traditional gender roles, where privileging men's preferences reflects hegemonic masculinity ([Courtenay, 2000; Rothgerber, 2013; Sobal, 2005](#)). In contrast, same-gender couples often exhibit egalitarian ideals and engage in effective negotiation patterns ([Rostosky & Riggle, 2017](#)) such that food preferences may be negotiated more equally. Overall, these findings highlight the importance of accounting for gender and couple gender composition in understanding dietary interdependence in couples.

### 7.3. Strengths, limitations and constraints on generality

This preregistered study addresses key gaps in the literature on how people share food systems with their romantic partner—for many the closest person in their lives. We extended prior qualitative research in small samples by using detailed quantitative measures, examining not only shared meal frequency (or even only cohabitation) but also similarity in food choices, specifically meat consumption, to examine associations with a range of different health outcomes. The predictive value of food choice similarity above and beyond shared meal frequency for relationship satisfaction highlights the importance of comprehensively capturing shared food systems. Unlike many previous studies, our shared meals measure clearly specifies the eating companions of interest and avoids ceiling effects or overly broad categories.

Drawing on recent, large-scale, and panel data representative of the German population, we provide robust and nuanced quantitative descriptive statistics across cohabitation forms, couple gender composition, and gender—including sufficient data for meaningful analyses in homosexual couples, who are frequently not included in such research. Despite our large sample size, the gender-diverse sample was not large enough for detailed analyses but the descriptives are a starting point for future studies. Our dyadic design, with both partners reporting their

own meat consumption, avoids perception biases of others and enhances the validity of our similarity measure.

Some limitations remain. First, self-reported measures of health behavior are inherently susceptible to biases, such as social desirability (e.g., respondents may underreport behaviors like meat consumption because they feel that this is the expected answer). The items were thoroughly pretested to reduce potential biases. Therefore, the advantages using panel data—particularly regarding generalizability and representativeness—should outweigh this limitation.

Second, our meat consumption measure captures daily frequency rather than individual meal frequency or portion sizes, making it less precise than our shared meals measure, but easier to report in a panel setting.

Third, as with all observational studies, no causal conclusions can be drawn. Although we controlled for plausible confounders, reverse causality and bidirectional effects are possible—for example, higher relationship satisfaction may both result from and promote greater interdependence in shared food systems. Selection effects may also play a role, as similar or interdependent eating patterns could be both a cause and a consequence of happier or longer term relationships. Future research should use longitudinal or intervention designs to better assess causal dynamics and explore how shared food systems could be modified to improve health.

This study used recent, population-based, quota-sampled panel data from Germany and likely generalizes well to German adults aged 18–49. As the panel excludes other age groups, generalizability to adolescent and older couples is limited. Older couples may share more meals because of fewer work constraints; adolescent couples, often not cohabiting, may share fewer. While individuals with a migration background or lower education were included in meaningful numbers, they remain underrepresented (Table 1)—consistent with typical survey biases. Thus we report both unweighted and weighted descriptive statistics. The study included both heterosexual and homosexual couples and descriptively reported on gender-diverse individuals, though the dyadic design prevented identification of polyamorous relationships. Findings may extend to similar Western contexts, though cross-national differences in eating norms and gender roles (e.g., Berge et al., 2024) warrant caution. Our definition of “shared meals” was deliberately limited to meals with romantic partners to address a specific research gap; comparisons to other meals should be made cautiously.

#### 7.4. Implications

This study highlights the importance of considering romantic partners as key eating companions in both theoretical models and health interventions. Eating in couples is interdependent: About half of all main meals are shared with one's partner, and meat consumption is often similar, suggesting many food decisions are made jointly. Yet, most theories of eating behavior still conceptualize eating as an individual act and neglect the social dynamics and the interdependence among eating companions (Mata et al., 2025). Our findings support calls to integrate eating companions more systematically into models of health behavior. For example, eating could be conceptualized as a shared behavior, at least for the many meals eaten together, shaped not only by one individual's cognitions, skills, and resources but also by those of their eating companions. Such shared decisions, in turn, affect the health of more than one person. Moreover, eating companions, such as romantic partners, may not necessarily “meet in the middle” of their preferences; rather, factors such as gendered power dynamics or roles in food preparation likely determine whose preferences carry more weight and should therefore be explicitly integrated into theoretical models of eating behavior.

In practice, this interdependence in eating offers both challenges and opportunities for promoting healthy eating. Interventions targeting eating behavior may be more effective when focusing on couples rather than individuals—especially during transitional phases such as the start

of a relationship or moving in together, when shared food systems are likely evolving. Although dyadic intervention research is still limited (Nizamani et al., 2022) it is a growing field, with recent efforts to systematize techniques (Di Maio et al., 2024).

Beyond diet, shared food system interdependence—particularly shared meal frequency—also seems to affect relationship, mental, and subjective health, highlighting the psychosocial importance of eating together. Interventions should consider how altering one partner's diet may affect the couple's broader food system. For example, pursuing a healthier diet individually, if the other partner is not willing to change, may carry psychosocial costs for both partners if it reduces eating interdependence. Costs and benefits of such dynamics over time need further study. Strategies such as eating together but choosing different foods might be beneficial, but initial research suggests they too may affect social outcomes (Woolley & Lim, 2023). Finally, our findings emphasize gendered patterns in shared food systems. In heterosexual couples, women appear to adjust their meat consumption more to their male partners than vice versa. Encouraging women to assert their typically healthier food preferences more strongly could benefit both partners by supporting healthier and more sustainable diets. Patriarchal power dynamics, especially in more traditional couples (Brown & Miller, 2002), might be a barrier that future interventions should consider.

#### 7.5. Conclusion

This large, quantitative study with a representative German panel shows that romantic couples have highly interdependent shared food systems with frequent shared meals and similar meat consumption, especially if cohabiting. Sharing more meals with one's partner has benefits relationship, mental, and subjective health. However, in heterosexual couples, shared meals also increase women's meat consumption while not changing men's - with no such gender moderation in homosexual couples. Theoretical models and health interventions should consider shared food systems of couples and gender roles to effectively support overall health.

#### CRediT authorship contribution statement

**Ira Elisa Herwig:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Vanessa Knobl:** Writing – review & editing, Methodology, Conceptualization. **Jutta Mata:** Writing – review & editing, Supervision, Conceptualization.

#### Information on the dataset

This study used FReDA panel data from the release v.5.0.0 (DOI: 10.4232/1.14462, Bujard et al., 2025). A detailed study description can be found in the panel introduction (Schneider et al., 2021) and a recent data brief (Hank et al., 2025). The dataset can be requested from GESIS ([https://search.gesis.org/research\\_data/ZA7777](https://search.gesis.org/research_data/ZA7777)) free of charge but signing a data protection contract is necessary.

#### Ethical statement

- 1) This material is the authors' own original work, which has not been previously published elsewhere.
- 2) The paper is not currently being considered for publication elsewhere.
- 3) The paper reflects the authors' own research and analysis in a truthful and complete manner.
- 4) The paper properly credits the meaningful contributions of co-authors and co-researchers.
- 5) The results are appropriately placed in the context of prior and existing research.

- 6) All sources used are properly disclosed (correct citation). Literally copying of text must be indicated as such by using quotation marks and giving proper reference.
- 7) All authors have been personally and actively involved in substantial work leading to the paper, and will take public responsibility for its content.

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## 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.

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## Appendix A. Supplementary data

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