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## **Normative Social Influence on Meat Consumption**

Laura Einhorn



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## Abstract

Studies from various disciplines show that including more meat-free dishes in our diets benefits our environment and our health while also promoting animal welfare. However, little is known about what encourages the adoption of more meat-free meal choices into our everyday diets. This paper focuses on the role of normative social influence on food choice as a potential answer to this question. In a real-world setting and based on the combination of a field and a survey experiment in seven German university dining halls, I analyze the impact of social norms on meat consumption in a single meal choice situation. I distinguish between descriptive and injunctive norms as well as between remote and direct norms. In a first step, descriptive and injunctive remote norm message interventions promoting a vegetarian diet were implemented. In a second step, the influence of direct social norms, i.e., the influence of vegetarian peers on non-vegetarians' meal choice, was assessed. I find that neither type of remote eating norm influences food choice, while direct normative influence leads to convergence towards vegetarian meal choices in a university setting. I summarize the implications of these findings, discuss their limitations, and point to directions for future research.

**Keywords:** descriptive norms, field experiment, food choice, injunctive norms, meat consumption, social influence, vegetarianism

## Zusammenfassung

Studien unterschiedlicher Fachdisziplinen betonen, dass sich eine fleischreduzierte Ernährungsweise positiv auf Umwelt, Tierwohl und auf die menschliche Gesundheit auswirken kann. Wir wissen dennoch wenig darüber, welche Faktoren eine solche Ernährungsweise begünstigen. Dieser Beitrag untersucht den Einfluss sozialer Normen als mögliche Antwort auf diese Frage. Basierend auf einem Feldexperiment und einer Umfrage in sieben deutschen Hochschulmensen wird analysiert, wie sich Ernährungsnormen auf die Entscheidung für oder gegen ein fleischloses Gericht auswirken. Es wird dabei sowohl zwischen deskriptiven und präskriptiven als auch zwischen direkten und indirekten pro-vegetarischen Ernährungsnormen unterschieden. Im ersten Schritt werden pro-vegetarische Normen durch experimentelle Interventionen implementiert. Im zweiten Schritt wird der Einfluss von Vegetarierinnen und Vegetariern auf die Menüwahl nicht vegetarisch lebender Menschen analysiert. Während die experimentellen Interventionen keinen Einfluss auf die Menüwahl der Mensagäste haben, passen sich Nicht-Vegetarierinnen und -vegetarier im studentischen Umfeld bei der Menüwahl tendenziell den vegetarisch essenden Mitgliedern einer Tischgemeinschaft an. Die Ergebnisse, Einschränkungen sowie die Implikationen dieser Studie für weitere Forschung werden abschließend diskutiert.

**Schlagwörter:** deskriptive Normen, Ernährung, Feldexperiment, Fleischkonsum, präskriptive Normen, soziale Normen, Vegetarismus

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# Normative Social Influence on Meat Consumption

## 1 Introduction

In many countries, meat has distinct cultural and social meanings in comparison to other types of food (Fiddes 1991; Fieldhouse 1995). Meat is a powerful part of national identities (DeSoucey 2010) and gender identities (Nath 2011; Rozin et al. 2012; Rothgerber 2013; Sumpter 2015). The strong link between meat dishes and long-standing rituals converts meat into a provider of normality, community, and social cohesion (Fiddes 1991; Stanford and Bunn 2001). Meat-eating is perceived as convenient, affordable, and tasty; it provides important nutrients and is routinized (Pohjolainen, Vinnari, and Jokinen 2015). In the same vein, Germany's regional cuisines are heavily based on meat and Germany is an important meat producer in the EU, especially for pork. The meat industry is the highest-selling of all food industries in the country (Federal Statistical Office 2017<sup>1</sup>). The traditional significance of meat products for the country is historically founded (Treitel 2017) and continues to be vigorously depicted in the enthusiasm many travel guides show for *Bratwurst* and *Schnitzel*.

On the other hand, the consumption of meat is increasingly surrounded by conflicting eating norms. Intensive livestock production and excessive meat consumption raise environmental as well as social objections. Claims that meat production contributes to climate change, water shortages, and overfertilization are extensively backed by scientific evidence (Ripple et al. 2013; Tilman and Clark 2014; Hedenus, Wirsenius, and Johansson 2014; Springmann et al. 2016). The excessive use of antibiotics in meat production is expected to lead to antibiotic resistance in humans (Silbergeld, Graham, and Price 2008), while frequent consumption of (primarily red) meat has been found to increase the risk of cardiovascular and other diseases (Willett and Stampfer 2013; Shen et al. 2015). Further, resource inefficiency in meat production is problematic in the face of global food insecurity and environmental injustice (Rosegrant, Leach, and Gerpacio 1999; Austin 2010; Rulli, Savioli, and D'Odorico 2013; Westhoek et al. 2014). These arguments increasingly question a state of excessive meat consumption and this, in turn, may slowly change food consumption behavior.

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1 <https://de.statista.com/statistik/daten/studie/38275/umfrage/umsatz-wichtiger-zweige-des-ernaehrungsgewerbes-seit-2008/>.

While vegetarianism has deep roots in several European countries, it has only gradually become more socially accepted in Germany over recent decades. Several meat scandals raised public awareness and several scientific studies have found their way into the popular media. More and more meat substitutes are being introduced into the German market. Restaurants are offering more vegetarian dishes and the percentage of vegetarians in Germany is reported to have increased from 1.6 percent in 2006 to 4.3 percent in 2016 (Mensink, Barbosa, and Brettschneider 2016; Pfeiler and Egloff 2018), heightening the visibility of an alternative dietary pattern and presenting an alternative eating norm.

Building on these trends and observations, this study attempts to shed light on behavioral change in a situation of norm conflict. Social influence on food choice may be weak for widespread and undisputed food items but could be pronounced when food items become contested and eating norms are ambiguous. Conflicting eating norms may become especially salient in eating situations in which vegetarians and non-vegetarians are present, leading to increased uncertainty about appropriate behavior. But which eating norm prevails in which context? To answer this question, I analyze if and to what extent social eating norms influence the consumption of meat in a specific eating situation. To my knowledge, there is no empirical research that investigates in which ways contested eating norms have an influence on the dynamics of meat consumption.<sup>2</sup> I explore these dynamics in a real-world setting based on a sample of university students in two large German cities. In a combined survey study and field experiment, I gathered primary data on two different types of normative influence on eating. I analyze whether and how people change their eating practices when confronted with conflicting eating norms – a meat norm versus a vegetarian norm – in a specific eating situation. In a first step, a pro-vegetarian eating norm is made salient by posters and information stands. In a second step, a pro-vegetarian eating norm is conveyed by the presence of vegetarian peers. German university students present a social group that is frequently exposed to vegetarian norms, so the sample in this study could potentially be a case in which vegetarian norm messages may have enough coercive power to change meat-eaters' food choices rather than vice versa.

The structure of this paper is as follows: In section 2, I elaborate on the theoretical background of this study. I clarify the difference between descriptive and injunctive norms, discuss how normative influence is mediated by contextual specificity and behavioral uncertainty, and apply these arguments to the study of eating norms. I derive three hypotheses to be tested empirically. Section 3 describes the research design and provides an overview of the different empirical settings. Section 4 and section 5 describe the measures, methods as well as the results of the two parts of the study separately. Section 6 discusses the methodological and theoretical limitations to this study and suggests avenues for future research. Section 7 concludes and contextualizes the findings in the light of existing research.

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2 One recent study by Christie and Chen (2018) analyzes unconscious behavioral mimicry based on observation of prior meat or non-meat choices but did not implement experimental stimuli and excluded peers.

## 2 (Eating) norms

In the social sciences, there is a vast amount of classical and contemporary literature that deals with the emergence, substance, persistence, and change of social norms. Most scholars agree that social norms are essential for creating and maintaining social order. Norms arise because they are useful, either to society at large (functionalist perspective, formulated and refined in the writings of Émile Durkheim, Talcott Parsons, or Robert Merton), to dominant classes (conflictual perspective, mainly inspired by the works of Karl Marx), or to those who enforce them (utilitarian perspective, associated with Jeremy Bentham, John Stuart Mill, and neoclassical economists). Because norms have a harmonizing function, social systems (societies, markets, social networks) are characterized by a high degree of inertia. However, norms can also be contested and resisted, and eventually lead to comprehensive changes to the social order.

As relevant guidelines in the realm of food consumption, eating norms are “perceived standards for what constitutes appropriate consumption, whether that be amounts of foods or specific food choices” (Higgs 2015, 39). Shared understandings of what is edible, of the appropriate way to prepare foods, of the division of labor involved, and of when and where and with whom to eat are among the most basic rules for human coexistence and have evolved over a long period of time. Eating is a paradigmatic example of a highly routinized practice, and one that is particularly resistant to change. Social eating norms in Western industrialized countries tell us to sit at a table when we eat, use silverware instead of our hands to do so, eat cake or drink sparkling wine on special occasions, and to not, while biologically possible, eat insects or cats or dogs or each other. However, over the last few decades, globalization and food abundance in industrialized countries have brought about more product diversity and an increased opportunity, as well as an imperative, for the individualization of food practices. This does not mean that the prevalence of social norms about appropriate dietary behavior has declined but that, ironically, it is increasingly denied (Nolan et al. 2008; Christie and Chen 2018; Croker et al. 2009). Fischler (1988) suggests calling the erosion of traditional eating norms and patterns a situation of “gastro-anomy.” A variety of widely agreed-upon eating norms are replaced by a plurality of new food consumption norms, or what Beardsworth and Keil (1992) call “menu pluralism.” These authors assert that, instead of the traditional menu, people may now revert to rational, hedonistic, moral, or convenience menus. Rather than these new menus increasing confusion and norm erosion, the authors see them as characterized by a “developing underlying coherence which marks the emergence of a much more open and flexible nutritional order” (ibid. 24). Flexibility also makes individual food choices more arbitrary, controversial, and debatable (cf. Warde 1997), and may create uncertainty about appropriate behavior. This opens up a new realm for social (dis-)approval and social influence.

In this paper, I approach the concept of social norms from a sociopsychological point of view. In this research tradition, norms are usually part of a micro-level framework, contributing to the explanation of (changes in) individual behavior. Norms are catego-

rized based on different criteria, and their impact on individuals' behavior is expected to be mediated by a variety of factors. The distinction between descriptive and injunctive norms, the varying contextual specificity of norms, and the level of behavioral uncertainty are relevant in the context of this study, which is why I will now discuss these concepts in more detail.

### Descriptive and injunctive norms

Social norms exert different types of social influence, reflected by the distinction between descriptive and injunctive norms (Cialdini, Kallgren, and Reno 1991) in social psychology. Descriptive norms offer an account of what others actually do – they refer to the perceived prevalence or typicality of a given behavior and thus offer an informational shortcut or a decision-making heuristic about the accuracy, appropriateness, or efficiency of a certain behavior. Injunctive norms, on the other hand, include a normative judgment by others and refer to the perceived degree of social approval or disapproval for a given behavior, i.e., what others think ought to be done. While descriptive and injunctive norms can and often do overlap, they are analytically distinct and many scholars emphasize the necessity to analyze them separately, as they show unique effects on a range of behavioral outcomes (Lapinski and Rimal 2005; Rimal and Real 2005; Smith and Louis 2008; Smith et al. 2008; Jacobson, Mortensen, and Cialdini 2011). Jacobson, Mortensen, and Cialdini (2011) provide evidence that each type of norm is associated with different psychological response tendencies: while individuals react to descriptive norms based on the intrapersonal goal of behavioral accuracy or efficiency, injunctive norms are, in addition, associated with the interpersonal goal of social approval and ingratiation. Injunctive norms are thus related to a twofold goal and are theorized to create greater conflict in, as well as greater social influence effects on, individuals (Cialdini, Kallgren, and Reno 1991; Smith and Louis 2008). Injunctive and descriptive norms can be congruent, but they can also be antagonistic and provide conflicting normative influence, in which case they can also interact and moderate each other's effect (Lapinski and Rimal 2005; Rimal and Real 2005; Smith and Louis 2008; Schultz et al. 2007).

Several psychological studies look at whether, how, and to what extent eating norms impact food-related decisions. When it comes to social influence on eating patterns, only a few studies to date have investigated whether descriptive or injunctive remote norm messages are more influential. They suggest that descriptive norms are more effective for behavioral change than injunctive norms or health messages when they are not context-specific (see below; Mollen et al. 2013; Robinson, Blissett, and Higgs 2013; Robinson, Fleming, and Higgs 2014; Robinson 2015; Collins et al. 2019), contradicting the argument that the impact of injunctive normative influence exceeds the impact of descriptive normative influence. This opens up plenty of opportunities for, and demands, further research in this area.



## Contextual specificity and behavioral uncertainty

The level of normative social influence on behavior also depends on the salience of the norm in a given context (Cialdini, Kallgren, and Reno 1991; Smith and Louis 2008; Jacobson, Mortensen, and Cialdini 2011) as well as on its contextual specificity (Smith and Louis 2008). Contextual specificity describes the norm source on a continuous scale between proximity and distance: the group the norm relates to can consist of close peers (e.g., friends, partners), of a broader reference group (e.g., students in the same university, residents in the same area), or it can be very abstract and refer to the society (or even humankind) as a whole. Empirical studies have shown that normative influence increases with higher context specificity of the norm source (Smith and Louis 2008). In the same vein, affiliation and identification with the norm source impact the strength and direction of normative influence. Whether the norm source is an in-group or an out-group (Lapinski and Rimal 2005; Rimal and Real 2005; Smith and Louis 2008) is especially relevant for injunctive norms because concerns about social approval and disapproval become more meaningful the more a person desires to be part of the group that represents a norm. The desire to maintain a positive self-concept (Cialdini and Goldstein 2004) and to signal one's self-identity to a group (Lapinski and Rimal 2005; Jacobson, Mortensen, and Cialdini 2011) are inextricably linked to the phenomenon of social norm conformity. Depending on a person's prior attitude towards a specific behavior and the behavior's relevance for a person's self- and group identity, normative influence works differently and may even create counter-conformity (especially when the salient behavior has a strong moral component, cf. Hornsey et al. 2003; Smith and Louis 2008). Vice versa, when a person does not have strong opinions about a behavior, increased uncertainty about the appropriate course of action should strengthen the influence of both types of norms (Lapinski and Rimal 2005; Jacobson, Mortensen, and Cialdini 2011).

In the literature on social modeling of food intake or choice, norms are sometimes characterized by the distinction between direct (or live) and remote norms (Roth et al. 2001; Feeney et al. 2011; Robinson and Higgs 2013; Cruwys, Bevelander, and Hermans 2015; Vartanian et al. 2015), capturing the proximity – the contextual specificity – of the norm source. Direct social norms are provided by others who are present in a given situation (high context specificity, often peers), while remote social norms can be inferred from norm messages of distant others (low context specificity, e.g., norm or health messages conveyed by posters or leaflets). Well researched in lab settings are the effects of different types of remote eating norms – those with low context specificity – on the amount of food intake and on the intake of snacks and sweets (Roth et al. 2001; Pliner and Mann 2004; Hermans et al. 2012; Robinson, Benwell, and Higgs 2013; Vartanian et al. 2015). Empirical studies about normative influences on food intake and choice have also shown that normative influence increases with higher context specificity of the norm source (Robinson and Higgs 2013; Robinson 2015; Higgs and Thomas 2016), as well as when the norm source is an in- rather than an out-group (Cruwys, Bevelander, and Hermans 2015). However, studies about the influence of eating norms on food

choice are much scarcer and less consistent in their findings than studies about the amount of food intake (ibid.). Several authors have suggested that this is because certain food preferences and meal types are well established and enduring; they produce less uncertainty about appropriate behavior and are thus less prone to social influence (ibid.; Higgs 2015), which speaks to the role of behavioral uncertainty. The present study focuses on food choice, so I expect weak to at best moderate remote normative influence on meal choice.

## Hypotheses

I test two hypotheses about remote eating norms (low context specificity) in Part I of this study, and one hypothesis about direct eating norms (high context specificity) in Part II. The empirical studies to date provide inconclusive evidence and give no strong reason to expect that either descriptive or injunctive remote norm messages are more influential. In the first part of this study, I thus test the following hypotheses independently:

- (1a) *When a descriptive remote vegetarian eating norm is salient, a higher share of people will choose a vegetarian over a meat dish than otherwise.*
- (1b) *When an injunctive remote vegetarian eating norm is salient, a higher share of people will choose a vegetarian over a meat dish than otherwise.*

Direct eating norms potentially exert even more influence on eating patterns than remote eating norms, and it is reasonable to assume that this is especially true for injunctive norms because concerns about social approval and disapproval become more meaningful the more a person desires to be part of a group (Robinson, Blissett, and Higgs 2013). However, the exact mechanisms behind direct social influence are difficult to disentangle (DiMaggio and Garip 2012): peers may provide guidelines for appropriate behavior, they may exert pressure due to the possibility of immediate social sanctions, or they may facilitate social learning through shared knowledge and experience. Thus, I do not distinguish between descriptive and injunctive direct eating norms. However, I assume that vegetarian peers influence their non-vegetarian co-eaters instead of vice versa: non-vegetarians have a more flexible diet and may be less certain about their food choice (due to conflicting norms or due to the novelty of a situation), which can strengthen normative influence (Pliner and Mann 2004; Robinson, Blissett, and Higgs 2013; Higgs and Thomas 2016). Vegetarians tend to be highly committed to their diet (Horton 2003; Fox and Ward 2008; Cronin, McCarthy, and Collins 2014; Rosenfeld and Burrow 2017), and it is unlikely that they change their food choice in a favorable environment (i. e., vegetarian meal choices and no strong social sanctions). Their self-identity and moral stance towards meat consumption may even increase their commitment when conflicting norms are made salient (Hornsey et al. 2003). Thus, I do not expect vegetarians to adapt to their meat-eating fellows, although it is theoretically

possible, but I do expect meat-eaters to potentially abstain from meat in the presence of vegetarian co-eaters, as meat-eaters' food choices are much more malleable. Hence, I expect convergence towards vegetarian meal choices. In the second part of this study, I therefore test the following hypothesis:

(2a) *Meat-eaters are more likely to choose a vegetarian instead of a meat dish if a vegetarian co-eater is present.*

### 3 Research design

This paper is based on a combination of a field experiment and a survey study which took place in seven university dining halls in April and May 2018 in two large cities in Germany. Dining halls (*Mensen*, pl. of *Mensa*) in Germany are operated by publicly funded student services and provide (mainly) lunch to university students. They are usually well patronized. Their menus differ depending on their location and size, but they generally offer at least one meat-free dish per day. Employees and outsiders are also catered for but constitute a minority of guests.

Table 1 provides an overview of the seven settings. Every dining hall (*setting*) was part of the experiment only for a single day during lunchtime (usually 11am to 2pm) to avoid repeated participation. In Part I, to assess the influence of remote eating norms, two settings included an injunctive intervention and another three included a descriptive intervention on the day of study. For these five settings, I obtained sales data for all dining hall guests on the day of study (*treatment group*) as well as on a non-intervention day (*control group*). All seven settings were used to obtain data for the analysis of direct eating norm effects in Part II by handing out questionnaires to a sub-sample of dining hall guests (*respondents*).

Table 1 Description of study design, Part I and Part II

Dining Hall	Intervention?	Norm type	N (treatment)	N (control)	Survey?	N (respondents)
Mensa A	Yes	Descriptive	444	478	Yes	190
Mensa B	Yes	Descriptive	373	472	Yes	217
Mensa C	Yes	Descriptive	269	369	Yes	160
Mensa D	Yes	Injunctive	1,617	1,958	Yes	343
Mensa E	Yes	Injunctive	2,401	2,149	Yes	363
Mensa F	No	–	–	–	Yes	10
Mensa G	No	–	–	–	Yes	142

In the following sections, I present the results of the two parts of the study (field experiment and survey study) separately. Section 4 discusses the design, measures, and results of the field experiment, designed to assess the impact of remote social norm messages on food choice. Section 5 discusses the design, measures, and results of the survey study, designed to assess the impact of direct social norms (i. e., peer influence) on food choice.

#### 4 Part I: Remote vegetarian norms

My first objective is to find out whether remote social norms influence meat-eaters' meal choices in a single eating situation. Are dining hall guests more likely to choose a vegetarian over a meat dish when a descriptive or an injunctive remote vegetarian norm is made salient? I chose a German vegetarian advocacy organization (ProVeg) to represent the injunctive norm that eating meat was harmful to the environment and to animals and that members of the organization would approve of choosing a vegetarian over a meat dish.<sup>3</sup> A stand was installed at the entrance of two dining halls (Mensa D and E) that exposed students to the norm message upon entering the dining hall. The stands were both set up in front of the dining hall entrances and were highly visible. Four members of the organization were present at any time and reached out to anyone interested in talking to them. In addition, bills and flags conveyed the norm message. A descriptive norm message was presented to guests by posters at the entrance of three other dining halls (Mensa A, B, and C). These were created in cooperation with the university student services and can be found in the Appendix. The posters emulated the student services' design and claimed that two out of three students in the respective dining hall ate a meat-free dish every day.<sup>4</sup> This number was chosen in order to present students with a credible descriptive vegetarian norm. Posters showed an email address that could be contacted for debriefing, and ProVeg stall-keepers as well as principal investigators were instructed to hand over the same address to interested participants. Towards the end of the study period on each day, some students were debriefed on site upon request.

#### Measures and methods

To assess the impact of remote social norms on food choice, I use a pre-test post-test design because of different non-intervention conditions in each dining hall. That means that the effects of the interventions are analyzed within instead of between university dining halls because the dining hall menus and the characteristics of their guests present too many additional sources of variance. The level of analysis in this section is the Mensa level. The unit of analysis is the number of vegetarian meals sold per day, per dining hall. Aggregate sales data, including the number of each menu item sold, was obtained for every dining hall that featured an intervention (Mensa A through E) for two different days: (1) the day of the intervention (treatment group,  $t_1$ ) and (2) a non-intervention day, exactly one week ahead of the intervention day (control group,  $t_0$ ). The ratio of vegetarian to non-vegetarian dishes on the menu was the same on non-intervention days and on intervention days to account for supply differences as a potential source of variation. Using Pearson's chi-square ( $\chi^2$ ) tests, I compare the number of veg-

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3 The characterization of the intervention is not clear-cut. I will discuss this in section 6.

4 Depending on the dining hall, real numbers ranged from one out of three to one out of two students eating a vegetarian dish every day.

etarian meals sold ( $N_{veg}$ ) in one dining hall at two different points in time for all dining halls to check if they differ significantly across intervention and non-intervention days.

To check the visibility of the descriptive interventions, I asked about respondents' perception of the intervention in the questionnaires that I handed out (see section 5), i. e., whether they saw the poster and whether they could recall its content (see Figure 5 in the Appendix). Overall, about half of the respondents took notice of the intervention and about a quarter of all respondents remembered the exact message. This enables me to conduct two additional variants of chi-square tests to assess the impact of the descriptive interventions. Three variants – i. e., potential dyads – for control and treatment group comparisons are available here.<sup>5</sup>

Firstly, I compare survey respondents who saw the descriptive message (with or without recalling its content) at  $t_1$  to survey respondents who did not see the descriptive message at  $t_1$  (Variant [1]). I therefore exclude all eaters who have not received a questionnaire at  $t_1$  in the first step of my analysis, drastically reducing the sample size.<sup>6</sup> Secondly, I compare survey respondents who saw the descriptive message (with or without recalling its content) at  $t_1$  to all dining hall guests on the non-intervention day  $t_0$  based on aggregate sales data (Variant [2]). Thirdly, I compare all dining hall guests on the intervention day  $t_1$  (without knowing how many of them saw the descriptive message) to all dining hall guests on the non-intervention day  $t_0$  based on aggregate sales data (Variant [3]).

## Results

The results of the first two steps of the analysis for three sites (Mensa A through C, with reduced sample size) can be found in Table 2. Table 3 shows the results of the third step of analysis for all five experimental sites.

Table 2 shows that we cannot reject the null hypothesis that the descriptive intervention had no impact on meal choices for Mensa A through C. The pooled data for all three dining halls rejects hypothesis (1a), namely that a remote descriptive norm intervention leads to an increase in the number of vegetarian dishes sold.

Comparing the share of vegetarian dishes sold on days with an injunctive norm intervention to non-intervention days in dining halls D and E shows a similar result to dining halls A through C: I do not find an increase in the share of vegetarian dishes sold.

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5 I only use variant three to assess the impact of the injunctive intervention. I did not ask respondents whether they saw the injunctive intervention because it was close to impossible not to notice it upon entering the dining hall.

6 Comparing respondents who did not see the message to only those who could recall its exact content did not yield different results.

Table 2 Impact of descriptive intervention (Mensa A, B, and C), Variant (1) and (2)

	N <sub>meat</sub>	N <sub>veg</sub>	N <sub>meat</sub>	N <sub>veg</sub>	<i>p</i>
Variant (1)	Intervention not seen (t <sub>1</sub> )		Intervention was noticed (t <sub>1</sub> )		
Mensa A	62 (47.3 %)	69 (52.7%)	26 (52.0%)	24 (48.0%)	0.57
Mensa B	44 (54.3%)	37 (45.7%)	70 (54.3%)	59 (45.7%)	0.99
Mensa C	31 (36.5%)	54 (63.5%)	24 (34.3%)	46 (65.7%)	0.78
A+B+C	137 (46.1%)	160 (53.9%)	120 (48.2%)	129 (51.8%)	0.63
Variant (2)	Non-intervention day (t <sub>0</sub> )		Intervention was noticed (t <sub>1</sub> )		
Mensa A	251 (52.5%)	227 (47.5%)	26 (52.0%)	24 (48.0%)	0.95
Mensa B	277 (58.7%)	195 (41.3%)	70 (54.3%)	59 (45.7%)	0.37
Mensa C	193 (52.3%)	176 (47.7%)	24 (34.3%)	46 (65.7%)	0.01**
A+B+C	721 (54.7%)	598 (45.3%)	120 (48.2%)	129 (51.8%)	0.06

x<sup>2</sup>-tests for equality in proportions; \**p*<0.05, \*\**p*<0.01, \*\*\**p*<0.001.

Table 3 Impact of descriptive (Mensa A, B and C) and injunctive intervention (Mensa D and E), Variant (3)

	N <sub>meat</sub>	N <sub>veg</sub>	N <sub>meat</sub>	N <sub>veg</sub>	<i>p</i>
Variant (3)	Without intervention (t <sub>0</sub> )		Descriptive intervention (t <sub>1</sub> )		
Mensa A	251 (52.5%)	227 (47.5%)	239 (53.8%)	205 (46.2%)	0.689
Mensa B	282 (59.7%)	190 (40.3%)	230 (61.7%)	143 (38.3%)	0.571
Mensa C	193 (52.3%)	176 (47.7%)	122 (45.3%)	147 (54.7%)	0.083
A+B+C	726 (55.0%)	593 (45.0%)	591 (54.5%)	495 (45.5%)	0.760
	Without intervention (t <sub>0</sub> )		Injunctive intervention (t <sub>1</sub> )		
Mensa D	1,218 (62.2%)	740 (37.8%)	1,013 (62.6%)	604 (37.4%)	0.787
Mensa E	1,220 (56.8%)	929 (43.2%)	1,464 (61.0%)	937 (39.0%)	0.004**
D+E	2,438 (59.4%)	1,669 (40.6%)	2,477 (61.6%)	1,541 (38.4%)	0.035*
Total	3,164 (58.3%)	2,262 (41.7%)	3,068 (60.1%)	2,036 (39.9%)	0.061

x<sup>2</sup>-tests for equality in proportions; \**p*<0.05, \*\**p*<0.01, \*\*\**p*<0.001.

The injunctive norm in one dining hall even led to a slightly lower number of vegetarian dishes sold on the intervention day (Mensa E). I will come back to this observation in the discussion. Overall, based on the aggregate sales data, I find that neither the remote descriptive nor the remote injunctive norm increased the number of vegetarian dishes sold. Pooling the data from all five dining halls, there are no statistically significant results. I cannot assume a consistent effect of either descriptive or injunctive remote norms. This rejects both hypotheses (1a) and (1b).

## 5 Part II: Direct vegetarian norms

The second objective of this study is to assess the impact of direct social norms on meal choice, i. e., to find out whether meat-eaters adopt the meal choice of vegetarian peers in a single eating situation. Are meat-eaters more likely to choose a vegetarian over a meat dish in the presence of vegetarian co-eaters in contrast to meat-eating co-eaters? The analysis thus focuses on the meal choice of non-vegetarians. In all seven dining halls, the principal investigators distributed short questionnaires after guests had chosen their meals and sat down at their dining tables. The questionnaires were numbered and questionnaires with the same number were given to members of the same dining group to make them identifiable as fellow diners. Unaccompanied eaters did not receive a questionnaire, neither did persons whose dining group was not clearly identifiable. Thus, only a sub-sample of total dining hall guests is part of the survey study. The rejection rates were low, on average below five percent. The questionnaires included questions about the respondents' current meal, their usual frequency of eating meat,<sup>7</sup> their age, their gender, their field of study, and their position at the university (see Figures 4 and 5 in the Appendix for the full questionnaires). The level of analysis is the individual level and the unit of analysis is a meat-eater's meal choice.

### Measures and methods

(1) Individual Level. The questionnaire asked respondents to provide a description of the dish they were currently eating. I coded whether it was a vegetarian or meat dish. The binary choice of a vegetarian versus a meat dish is the dependent variable in the following analyses. Respondents provided the number of fellow diners, their usual meat consumption frequency (MCF, from 0 [never] to 5 [more than once a day]), their age, their gender, their position at the university, and, if applicable, their field of study. If respondents reported abstention from meat in their usual diet, they were classified as vegetarian.

(2) Group Level. I created measures for the size of the dining group, whether it was a mixed group (i. e., vegetarians and non-vegetarians eating together) or non-mixed. I also calculated the ratio of vegetarian compared to non-vegetarian eaters at each table. Dining groups were labeled as incomplete if the number of questionnaires obtained was lower than the reported size of the dining group.

(3) Mensa Level. I created a measure to control for the different menu structures in the seven university dining halls – the ratio of vegetarian to non-vegetarian dishes offered that day, called “supply” for reasons of simplification. Binary variables indicate the existence of either a descriptive or an injunctive intervention.

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<sup>7</sup> There might be a social desirability bias to report less usual meat consumption when one of the interventions was active, so the answers on that variable have to be treated with caution.

I tried to circumvent a couple of methodological challenges that are common in research on social influence. First, co-eaters are not randomly assigned to one another, they know each other and they may also know about each other's food habits. What appears as social influence could then be a result of a selection bias, i. e., homophily: a person with a low-meat diet might be more likely to accompany vegetarians to the dining hall and themselves choose a non-meat dish. Second, it is often difficult to know which person's food choice is modeled and which person's food choice functions as a template. By asking respondents about their usual meat intake, I create a rough measure of the extent to which regular eating habits of co-eaters diverge, i. e., what co-eaters would be eating if they were not part of the present social context. I am able to identify respondents' regular diets as well as patterns of divergence and convergence in everyday diets and situational food choices. Based on this data, a heavy selection bias into groups is unlikely: reported usual levels of meat consumption of non-vegetarians in mixed and in non-mixed groups (3.3 versus 3.4) are not significantly different.

### Descriptive results

In total, 1,425 respondents nested in 508 social dining networks participated in the study. Of them, 46 percent were female. About half (48.7 percent) of the chosen and recorded meals in all university dining halls were vegetarian. This reflects the menu structure in university dining halls with fifty percent of dishes offered being vegetarian on average. Eleven percent of respondents said they are on a vegetarian diet, which is a markedly higher number than among the overall German population (estimated at 4.3 percent, see Mensink, Barbosa, and Brettschneider 2016). We can clearly see that a larger percentage of women compared to men identified their usual diet as vegetarian (15.3 versus 7.54 percent). In the same vein, a higher ratio of female respondents ate meat-free dishes than did male respondents (53.7 versus 46.3 percent). Interestingly, this difference is not as pronounced as the overall gender differences in vegetarian diets. Women also reported a significantly lower meat consumption frequency than men (average meat consumption frequency of 2.5 versus 3.3); this holds true when vegetarians are excluded (2.9 versus 3.6) and confirms various studies on vegetarianism in Germany (Mensink, Barbosa, and Brettschneider 2016; Pfeiler and Egloff 2018). Three quarters of respondents were students. The average age of the respondents was 27 years, the median age 24 years. Most respondents were accompanied by one fellow eater (38 percent), some were accompanied by two others (26 percent), by three others (17 percent) or by four others (9 percent), while larger groups were rare. Interestingly, while only 161 respondents reported being on a vegetarian diet, 23 of them were accompanied only by other vegetarians – eleven dining tables were thus completely vegetarian. These are more vegetarian tables than we would expect from a random distribution of guests to dining groups. Homophily leads to a selection bias: vegetarians go to the university dining hall with other vegetarians more often than they do with meat-eaters. This does not bias the results of this study (which focuses on mixed groups) but decreases the number of mixed dining groups available for analysis in the next section.



## Analysis of social influence

As stated above, from the literature on social influence and direct norm effects, it can be assumed that fellow diners' consumption patterns converge (in this setting) towards a vegetarian meal choice when accompanied by a vegetarian eater. In a different social or cultural setting, with a different supply structure, or based on a different sample of eaters, fellow diners may very well be expected to converge towards eating a meat dish.

For several groups, only incomplete data could be obtained. These dining tables were dropped from the data set for the subsequent analysis of social influence. This leaves 1,247 respondents overall and 1,037 non-vegetarians nested in 428 groups. Table 5 (Appendix) gives a detailed description of the variables used in the analysis. 920 respondents (74 percent) were part of either only vegetarian or only meat-eating dining networks, i. e., non-mixed groups. 327 respondents (26 percent) were part of a mixed group, i. e., a dining network that included at least one vegetarian and one meat-eater. I exclude vegetarians from the analysis because they are likely to choose a vegetarian dish in any case. The data set for the following analysis consists only of non-vegetarians. Due to missing data on some variables, the final number of cases is 1,021 respondents nested in 427 dining groups. The dependent variable here is dichotomous: the choice of a meat dish or of a vegetarian dish. I pooled data from all seven university dining halls and performed random-intercept logistic regression analyses, with respondents nested in dining groups. Due to the marked differences in meat consumption frequency between male and female respondents, I report the results for men and women separately in addition to the results for the overall sample. In Model (1), I look at the effect of the independent variable of interest, the percentage of vegetarians at a given dining table exclusively. I use the share of vegetarian eaters at a given dining table as a more nuanced, continuous variable instead of the simple binary variable of being part of a mixed group or not. The variable shows a significant positive effect in the female, the male, and the pooled sample. I consecutively add control variables to test if this result holds. In Model (2), I control for location by adding dummies for each dining hall to the model. I also include the number of fellow diners. The latter variable does not influence meal choice, and only one dining hall shows a significant negative effect on vegetarian meal choice for the male-only sample. It is the dining hall with the lowest supply of vegetarian dishes (only one quarter of all dishes offered being vegetarian) and it also features an injunctive intervention. Unfortunately, it is impossible to assess whether (let alone why) male respondents reacted more negatively to the intervention in this dining hall or whether the meal choices of male respondents were in general more strongly influenced by the dining halls' offers than the meal choices of female respondents. In Model (3), I add several individual-level variables: respondents' gender, age, their meat consumption frequency, their position at the respective universities, and their field of study (the full results are reported in Table 6 in the Appendix). Neither position nor field of study or age show consistent effects on the dependent variable. Unsurprisingly, meat consumption frequency exerts a strong negative effect on the likelihood of choosing a vegetarian dish. Gender is not significant due to its high correlation with meat consumption fre-

Table 4 Random intercept models on likelihood of vegetarian meal choice

	Model (1)			Model (2)			Model (3)		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
Share of vegetarians	6.634* (5.606)	7.501** (5.626)	6.596*** (3.650)	7.823* (6.615)	6.028* (4.257)	6.427*** (3.479)	12.073** (11.512)	8.328** (6.146)	8.222*** (4.922)
Table size				1.108 (0.106)	1.106 (0.084)	1.064 (0.063)	1.114 (0.125)	0.117 (0.064)	1.061 (0.077)
MCF							0.360*** (0.059)	0.476*** (0.056)	0.415*** (0.039)
Female							(omitted)	(omitted)	1.131 (0.203)
Age							1.003 (0.020)	0.981 (0.014)	0.993 (0.012)
Constant	0.812 (0.114)	0.495*** (0.062)	0.610*** (0.057)	0.547 (0.226)	0.581 (0.171)	0.610* (0.153)	10.712* (12.622)	35.240*** (34.253)	22.864*** (17.907)
ICC	0.260	0.170	0.195	0.233	0.089	0.162	0.232	0.061	0.192
Observations	440	581	1,021	440	581	1,021	440	581	1,021

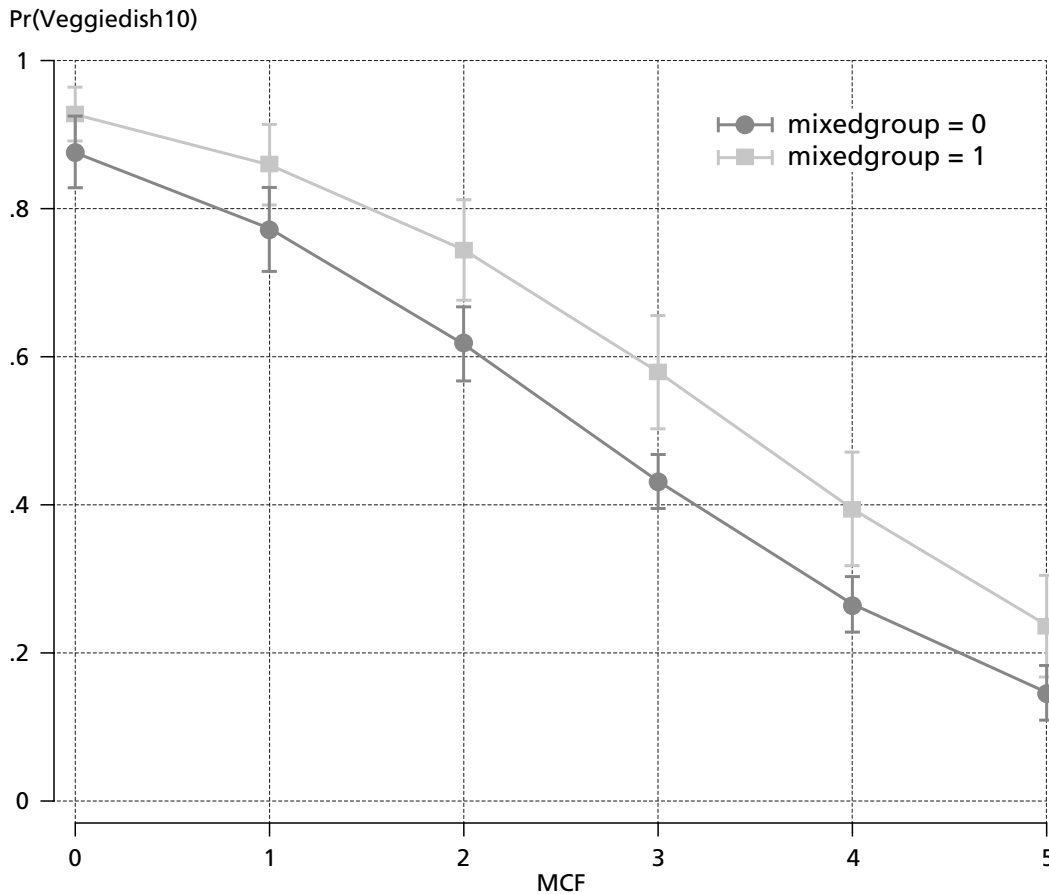
Note: Random intercept logistic regressions. Odds ratios are reported. Standard errors in parentheses. Model (2) controls for dining hall, not reported. Model (3) controls for dining hall, field of study and respondent's position, not reported; MCF=meat consumption frequency, ICC=intraclass correlation coefficient; \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

quency. Removing meat consumption frequency from the model renders gender highly significant. Age does not have an effect, which should be mainly due to its lack of variance. The main independent variable, the share of vegetarians accompanying a non-vegetarian, still exhibits a significant positive effect on vegetarian meal choice and thus seems to be fairly robust (Table 4).<sup>8</sup>

The variable is highly significant for the female-only, the male-only, and the overall sample. Being part of a dining group that includes vegetarians increases the odds of choosing a vegetarian dish for non-vegetarians, and this effect is stronger the more fellow diners are vegetarians. Figure 1 illustrates this finding by showing the average marginal effects the binary variable for being part of a mixed table has on the likelihood of choosing a vegetarian dish with different levels of meat consumption for all respondents. These findings support hypothesis (2a). I argue that this is likely to be a result of social influence and not only of homophily, i. e., of the composition of the group, because meat-eaters with and without vegetarian co-eaters report the same levels of meat consumption in their usual diet. Still, I cannot rule out the possibility that meat-eaters who dine out with vegetarians are generally more receptive to eating meat-free dishes even if this might not be reflected by differences in their usual diet. Clearly, there is a plethora of opportunities to follow up on the findings of this study in future research. In

8 Logistic regression models produce similar results. However, likelihood ratio tests show that the random-intercept model performs significantly better than the logistic regression model for the female and the total sample. In fact, up to 26 percent of the overall variance can be attributed to the group level, as shown by the intra-class correlation.

Figure 1 Average marginal effects of mixed groups (with 95% CIs) on likelihood of vegetarian meal choice depending on meat consumption frequency



the next paragraph, I elaborate on these prospects and provide a brief overview of the limitations of this study before I discuss my findings against the backdrop of relevant literature and related empirical evidence.

## 6 Limitations and prospects for future research

There are some methodological and substantial limitations to this study. First, the remote descriptive norm message was not highly visible and was only recognized by a subset of respondents. The intervention may not have been as efficacious as possible, which we need to keep in mind when interpreting the results obtained from the full sample of diners. Subsequent studies that try to analyze the effects of remote norm messages need to pay attention to the salience and visibility of the interventions so that potentially non-significant effects can be more clearly attributed to the inefficacy of interventions instead of to their low visibility.

Second, the results of the first part of this study are based on aggregate sales data from two different days per dining hall. While I ensured the comparability of the menu structure (i. e., share of vegetarian options) across days and chose the same weekday for  $t_0$  and  $t_1$ , there may be other factors which are beyond my control. The vegetarian dishes may have been more or less appealing on either day, the waiting lines may have been different, etc. Future studies may address this limitation by compiling more data from different locations so that idiosyncratic contextual factors can cancel each other out. Another promising but more time-consuming strategy is to distribute a greater number of individual questionnaires so that the impact of an intervention can be assessed based on data from a treatment and a control group (those who saw the intervention versus those who did not) within the same day.

Third, the injunctive remote norm messages could have also been interpreted differently, not linked, or only marginally linked, to social approval. The intervention may have been perceived as an injunctive norm message about what a certain group of people (the advocacy group ProVeg) approves of; but it may have also been perceived as lecturing or even patronizing, similar to the messages in Spaargaren et al. (2013) or the health messages in Robinson, Fleming, and Higgs (2014), both of which showed no or even reverse effects on the behavior they were supposed to alter. Future studies should make sure to design interventions that adequately present distinct types of norm messages in order to assess their unique impact on recipients' behavior.

Fourth, the present research design is not suited to identifying the precise mechanism of social influence behind peers' food choice convergence. This was not the main aim of this study, but it still warrants attention if we want to gain a more profound understanding of the origins and consequences of social influence. Peers can provide descriptive as well as injunctive norm messages. While I argue that social influence was at play in this study, the same meal choice may have been a result of jointly waiting in line (a social network mechanism that DiMaggio and Garip [2012] call network externalities but that, strictly speaking, is not normative influence). We may also want to know whether food choices were made consciously, as a deliberate decision, or if the mechanisms operated tacitly, as an unconscious consequence of emotional reactions to a particular situation (Cialdini and Goldstein 2004). We can only speculate if peer pressure operates more indirectly and unconsciously through emotional responses evoked by the desire for social approval or if respondents deliberately adapt their food choices to please others. Whether the effect in this study is a result of peer pressure (i. e., injunctive normative influence), of a situational cue about behavioral accuracy (i. e., descriptive normative influence), or of long-term social learning is not clearly distinguishable, but its mere existence opens up a plethora of opportunities for future research, including different methodological approaches. Related to this, the research presented here asks whether and how conflicting social eating norms change individual practices in a particular situation. It does not ask for their role in long-term, durable transformations, even though these cannot easily be kept separate. The respondents in this study were exposed to the remote messages only once, but they may have spent several lunch breaks with their

vegetarian peers, which eventually leads to measurable direct social norm effects in a specific setting. It is likely that repeated interactions with vegetarian peers promote knowledge exchange and increased acceptance of different dietary choices. This could be a reason why vegetarian peers have a greater influence on others' meal choices than one-time norm messages about unknown others. Repeated exposure to remote norm messages may also have observable effects over time. On the other hand, we might expect that peers influence each other less as they know each other's preferences better and accept differences in diets. Still, we see modeling of food choices in peers in this study – if we assume that co-eaters are usually friends or at least acquaintances. There are ample opportunities for future research to explore the issue of repeated exposure to norm messages and the role of the nature of the social relationships between fellow diners for food choice modeling.

Lastly, the results presented here are based on a non-representative sample of mostly young and well-educated eaters. The proportion of vegetarians to meat-eaters here is higher than among the general population (Mensink, Barbosa, and Brettschneider 2016; Pfeiler and Egloff 2018). The study population is characterized by little variance in education, residential area, and age. Guests in university dining halls present only a limited sample, and one in which the social influence effects might work differently – with different force or even in a different direction – than in other samples. This is due not only to differences in prevalence and (expected) acceptance levels of vegetarian diets but also simply to the supply structure in university dining halls. The fact that in every dining hall, one third to half of all guests chose a vegetarian meal was most likely facilitated by the different options that were offered. Other dining halls only offer limited vegetarian choices and focus much more on meat dishes, which in turn is likely to have an impact on the probability of choosing a vegetarian option. Another important direction for future studies is thus to focus on other social contexts and to investigate whether the present findings persist. This includes other social groups but also different material as well as cultural settings. In general, conformity might be of varying relevance across cultures (Cialdini and Goldstein 2004). Adopting a comparative perspective can help to illuminate different cultural perceptions and narratives of food and meat consumption in particular and resonates with a broader field of research in food studies.

## **7 Conclusions and discussion**

Based on a sample of German university students and faculty, I analyze whether meat-eaters choose a meat-free dish over a meat dish in university dining halls when exposed to different types of vegetarian eating norms by experimental interventions or by their fellow diners. That people imitate or assimilate others' food intake behavior and, albeit to a lesser extent, model their food choices is a consistent finding in laboratory studies. Lab settings seek to represent real-life situations, but it is often less clear whether the

results are replicable outside the laboratory (Korzen and Lassen 2010; Bless and Burger 2016). In a real-world setting, I avoid many pitfalls that are associated with laboratory research and contribute to the imperative that more research in applied, real-world settings is critical to validate and support findings on the direction and scope of social modeling effects (Cruwys, Bevelander, and Hermans 2015; Collins et al. 2019). The main findings of this study are as follows:

(1) Using sales data, I find that neither descriptive nor injunctive remote vegetarian norms influence the meal choices of dining hall guests. The descriptive norm effect may be underestimated due to the low visibility of the norm message poster, but also a partial analysis, including only the small number of respondents who could readily recall the descriptive norm message, does not provide any reason to assume that the effect exists at all. The vegetarian advocacy campaign that was intended to convey an injunctive norm but was informational at the same time even produced a converse effect in one setting: the number of vegetarian dishes sold declined. While the statistical evidence for this effect is inconclusive, what we may have observed here is the “boomerang effect” of information campaigning (Collins et al. 2019): people may defy norm messages and act in opposition to them if they feel lectured or infantilized. Written comments on the distributed questionnaires support this argument: a few guests intentionally highlighted their preference for meat, potentially feeling patronized by the intervention and expressing active opposition to the vegetarian norm. Similarly, Spaargaren et al. (2013) show that injunctive norm messages can be perceived as disruptive and negative in the context of the continuity and predictability of the dining hall setting. A high level of routinization characterizes lunch practices for most guests, rendering them very resistant to change (Mollen et al. 2013; Spaargaren et al. 2013). The effectiveness of any remote norm or information message thus rests on the potential to modify routines while not disrupting them in parallel. Many studies in medicine, public health and behavioral sciences, psychology, and environmental studies look at the impact of remote norm messages, or at the impact of the provision of information to steer consumers’ food choices in a healthier or more environmentally sustainable direction. These strategies are either supposed to empower consumers and to “improve” their decision-making ability or to influence their behavior on a more subliminal level. The usefulness of most of these approaches has increasingly been called into question across disciplines (Spaargaren 2003; Croker et al. 2009; Downs, Loewenstein, and Wisdom 2009; Robinson, Benwell, and Higgs 2013; Robinson, Fleming, and Higgs 2014; Collins et al. 2019) and the present research seems to support the grounds for some of this skepticism.

(2) Based on self-reported questionnaires, I found that meat-eaters who are accompanied by vegetarians are more likely to choose a vegetarian dish than meat-eaters who are accompanied by other meat-eaters alone. This probability increases as the number of vegetarian co-eaters increases, independent of the meat-eater’s gender. Eaters are most likely to modify their food choices if opposing eating norms are represented by direct social ties, i. e., if the contextual specificity of the norm source is high (Smith and Louis 2008; Robinson, Blissett, and Higgs 2013; Robinson 2015; Higgs and Thomas 2016)

or the norm source is an in-group (Lapinski and Rimal 2005; Rimal and Real 2005; Smith and Louis 2008; Cruwys, Bevelander, and Hermans 2015). This seems plausible given that potential social sanctions by vegetarian peers are immediate but do not exist in a remote norm message condition. Theoretically, it is debatable whether remote norms could ever be as effective in changing food choice as direct social norms. Food choice is not visible beyond the immediate eating situation, so social sanctions resulting from different behavior can primarily be exerted by peers. By default, peer pressure is one of the central factors promoting behavioral consistency and congruence in social groups and inhibiting behavioral change. The more homogeneous a social group's food consumption practices are, the more resistant they are to changes. At the same time, heterogeneous groups with conflicting food norms present one option for behavioral change which is revealed in the present study. Having said this, another interesting finding in the present study was that vegetarians are much more likely to visit the dining hall with other vegetarians than would be expected at random. Birds of a feather flock together, and this aggravates exposure to diverging norms in social groups. Another important objective for research is thus to pay attention to how consumption patterns can contribute to social closure and how they themselves affect – and are not only affected by – social structure. Are those that are connected in a social network or belong to the same group simply more likely to become vegetarian anyway? Or do vegetarians alter their social networks over time to include a higher share of vegetarians? The truth is likely to be found somewhere in between, and this is a vital area for further research, especially because of the potentially polarizing character of the vegetarianism debate. Moreover, since the health and environmental benefits of reduced meat consumption are well established (Ripple et al. 2013; Willett and Stampfer 2013; Hedenus, Wirsenius, and Johansson 2014; Katz and Meller 2014; Shen et al. 2015), it is an important objective for research in different disciplines to understand how eating routines emerge and how they may change in different social settings. It has been shown that diet quality differs across social groups (Darmon and Drewnowski 2008; 2015) and its harmonization is necessary to reduce health discrepancies and provide equal quality of life to groups of different socioeconomic status.

Finally, we cannot neglect the importance of the structure of supply as an overarching determinant of dietary choice and dietary change. In most locations, the German student services strive to offer about as many vegetarian as non-vegetarian options to their guests each day. This is an exception in public catering and in the food service industry in general. The structure of food supply and its interaction with social influences on (non-)vegetarian meal choice are important components of dietary choice and present many research opportunities. Research in the sociology of consumption and of food can take up this sociopsychologically inspired study and add their own methodological and theoretical approaches to provide a more comprehensive picture of food choice and the extent to which social networks may contribute to immediate and to more long-term changes in people's diets. This is especially interesting for food products that are increasingly contested in public discussions and over which stakeholders with different interests fight to maintain or establish their position in a dynamic interplay of supply and demand.

## Appendix

Table 5 Variable description for complete networks (N= 1,247), missings not shown

Variable	Distribution
Vegetarian dish	Yes (45.95%) No (48.36%)
Vegetarian diet	Yes (11.33%) No (88.67%)
Gender	Female (45.23%) Male (53.65%)
Age (years)	$\bar{X}$ = 27.0 Min = 16; Max = 84
Position	Student (76.49%) Administration (4.42%) Guest (5.32%) PhD (5.65%) Researcher/Professor (5.73%) Other (2.37%)
MCF	More than once a day (15.27%) Once a day (17.36%) More than once a week, not daily (38.34%) More than once a month, not weekly (12.70%) Less often (4.98%) Never (11.33%)
Department	STEM (17.96%) Law and Economics (24.14%) Engineering (18.28%) Arts (4.33%) Humanities (4.09%) Medicine (11.95%) Social Sciences (3.61%) None (15.64%)
Group size	$\bar{X}$ = 3.332 Min = 2; Max = 13
Mixed group	Yes (26.22%) No (73.78%)



Figure 2 Poster intervention in Mensa B



**Wussten Sie schon?**  
*Wir haben mitgezählt!*

**In dieser Mensa  
entscheiden sich jeden  
Tag **2 von 3 Gästen** für  
ein vegetarisches oder  
veganes Gericht.**

Für weitere Informationen wenden Sie sich an: [durst@kstw.de](mailto:durst@kstw.de), [le@mpifg.de](mailto:le@mpifg.de)

Figure 3 Poster intervention in Mensa A and C



**Wussten Sie schon?**  
*Wir haben mitgezählt!*

In dieser Mensa  
entscheiden sich jeden Tag  
**2 von 3 Gästen**  
für ein vegetarisches oder  
veganes Gericht.

**Ihr Mensa-Team**

> [www.stw.berlin](http://www.stw.berlin) > [mensen@stw.berlin](mailto:mensen@stw.berlin) > [le@mpifg.de](mailto:le@mpifg.de)

Figure 4 Questionnaire distributed in dining halls, version 1

Hallo! In diesem Fragebogen geht es darum, was Du isst und mit wem Du isst. Das Ausfüllen dauert nicht lange und hilft uns sehr. **Und Du kannst 100 Euro gewinnen, wenn Du unten Deine E-Mail-Adresse angibst!** Deine Daten werden natürlich vertraulich behandelt und bei der Auswertung anonymisiert! Guten Appetit!

1. Mit wie vielen Personen isst Du gerade gemeinsam? (OHNE Dich selbst mitzuzählen)

\_\_\_\_\_

2. Was isst Du gerade bzw. was hast Du gegessen? Bitte gib an, für welches Gericht Du Dich heute hier in der Mensa entschieden hast.

\_\_\_\_\_

3. Wenn Du allgemein an Deinen Speiseplan denkst, wie oft isst Du ungefähr Fleisch (auch Wurst, Fertigprodukte mit Fleisch etc.)?

- Mehrmals am Tag   
  Einmal am Tag   
  Mehrmals die Woche, aber nicht täglich  
 Mehrmals im Monat, nicht jede Woche   
  Seltener  
 Ich esse kein Fleisch   
  Anderes: \_\_\_\_\_

4. Wenn Du in die Mensa gehst, bist Du dann normalerweise in Begleitung?

- Ja, immer.   
  Ja, meistens.   
  50-50  
 Eher selten.   
  Nein, nie.

5. Wie alt bist Du?

\_\_\_\_\_

6. Dein Geschlecht?

\_\_\_\_\_

7. Was ist Deine Position hier an der Uni? (z.B. StudentIn MA oder BA, SekretärIn, HausmeisterIn, DoktorandIn, KüchenchefIn, ProfessorIn, VerwaltungsangestellteR...)

\_\_\_\_\_

8. Wenn Du studierst oder in einem Fachbereich arbeitest, welcher ist das?

\_\_\_\_\_

Super, das war es schon! Bitte gib den Fragebogen zurück an eine/n der StudienleiterInnen. Wenn Du an der Verlosung der 100 Euro teilnehmen möchtest, gib hier Deine E-Mail-Adresse an:

\_\_\_\_\_

Vielen Dank für Deine Teilnahme!

Figure 5 Questionnaire distributed in dining halls, version 2

Hallo! In diesem Fragebogen geht es darum, was Du isst und mit wem Du isst. Das Ausfüllen dauert nicht lange und hilft uns sehr. **Und Du kannst 100 Euro gewinnen, wenn Du unten Deine E-Mail-Adresse angibst!** Deine Daten werden natürlich vertraulich behandelt und bei der Auswertung anonymisiert! Guten Appetit!

1. Mit wie vielen Personen isst Du gerade gemeinsam? (OHNE Dich selbst mitzuzählen)

\_\_\_\_\_

2. Was isst Du gerade bzw. was hast Du gegessen? Bitte gib an, für welches Gericht Du Dich heute hier in der Mensa entschieden hast.

\_\_\_\_\_

3. Wenn Du allgemein an Deinen Speiseplan denkst, wie oft isst Du ungefähr Fleisch (auch Wurst, Fertigprodukte mit Fleisch etc.)?

- Mehrmals am Tag     Einmal am Tag     Mehrmals die Woche, aber nicht täglich  
 Mehrmals im Monat, nicht jede Woche     Seltener  
 Ich esse kein Fleisch     Anderes: \_\_\_\_\_

4. Wenn Du in die Mensa gehst, bist Du dann normalerweise in Begleitung?

- Ja, immer.     Ja, meistens.     50-50  
 Eher selten.     Nein, nie.

5. Wie alt bist Du?

6. Dein Geschlecht?

\_\_\_\_\_

\_\_\_\_\_

7. Was ist Deine Position hier an der Uni? (z.B. Studentin MA, Student BA, Hausmeisterin, Doktorand, Küchenchef, Professorin, Verwaltungsangestellter...)

\_\_\_\_\_

8. Wenn Du studierst oder in einem Fachbereich arbeitest, welcher ist das?

\_\_\_\_\_

9. Am Eingang der Mensa hing ein Plakat zum Thema Vegetarismus. Ist es dir aufgefallen?

- Nein.     Ja, aber nicht näher betrachtet.     Ja, hier essen 2 von \_\_\_ Gästen vegetarisch.

Super, das war es schon! Bitte gib den Fragebogen zurück an eine/n der StudienleiterInnen.

Wenn Du an der Verlosung der 100 Euro teilnehmen möchtest, gib hier Deine E-Mail-Adresse an:

\_\_\_\_\_

Vielen Dank für Deine Teilnahme!

Table 6 Random intercept models, full table

	Model (1)			Model (2)			Model (3)		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
Share of vegetarians	6.634* (5.606)	7.501** (5.626)	6.596*** (3.650)	7.823* (6.615)	6.028* (4.257)	6.427*** (3.479)	12.073** (11.512)	8.328** (6.146)	8.223*** (4.922)
Table size				1.108 (0.106)	1.101 (0.077)	1.064 (0.063)	1.114 (0.125)	1.106 (0.084)	1.097 (0.077)
Mensa A				1.829 (0.881)	0.442 (.189)	1.016 (0.318)	3.273* (1.772)	0.621 (0.277)	1.356 (0.479)
Mensa B				0.717 (0.349)	0.565 (0.221)	0.636 (0.200)	1.058 (0.659)	0.585 (0.267)	0.663 (0.261)
Mensa C				1.502 (0.832)	2.013 (0.793)	1.803 (0.607)	1.162 (0.838)	1.512 (0.783)	1.258 (0.565)
Mensa D				1.331 (0.610)	0.379* (0.148)	0.734 (0.218)	1.367 (0.920)	0.262* (0.143)	0.511 (0.219)
Mensa E				1.022 (0.492)	0.717 (0.230)	0.772 (0.216)	0.737 (0.459)	0.563 (0.247)	0.555 (0.212)
Mensa F				(omitted)	5.052 (6.504)	5.291 (7.228)	(omitted)	3.842 (5.674)	6.739 (10.533)
MCF							0.360*** (0.059)	0.476*** (0.056)	0.415*** (0.039)
Female							(omitted)	(omitted)	1.131 (0.203)
Age							1.003 (0.020)	0.981 (0.014)	0.993 (0.012)
Law/Economics							0.419 (0.270)	0.939 (0.504)	0.619 (0.253)
Engineering							0.879 (0.640)	1.374 (0.710)	1.086 (0.458)
Medicine							0.381 (0.275)	2.226 (1.466)	0.934 (0.455)

Table 6 Continued from previous page

	Model (1)			Model (2)			Model (3)		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
STEM							0.864 (0.529)	1.183 (0.604)	1.013 (0.400)
Social Sciences							0.095* (0.089)	2.658 (2.264)	0.345 (0.210)
Humanities							0.482 (0.395)	1.302 (0.953)	0.793 (0.444)
Arts							0.356 (0.316)	1.215 (0.986)	0.622 (0.384)
Student							1.733 (1.221)	0.286* (0.165)	0.656 (0.298)
Administration							0.462 (0.420)	0.443 (0.351)	0.423 (0.247)
External							0.717 (0.614)	0.463 (0.298)	0.509 (0.274)
PhD							4.046 (3.789)	0.366 (0.250)	1.053 (0.591)
Researcher							1.036 (0.904)	0.373 (0.255)	0.669 (0.362)
Constant	0.812 (0.114)	0.495*** (0.062)	0.610*** (0.057)	0.547 (0.226)	0.581 (0.171)	0.610* (0.153)	10.712* (12.622)	35.240*** (34.253)	22.864*** (17.907)
ICC	0.260	0.170	0.195	0.233	0.089	0.162	0.232	0.061	0.192
Observations	440	581	1,021	440	581	1,021	440	581	1,021

Note: Random intercept logistic regressions. Odds ratios are reported. Standard errors in parentheses. Dining hall reference: Mensa G. Field of study reference: No department. Respondent's position reference: Other.  
\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

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