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Can guided introspection help avoid rationalization of meat consumption? Mixed-methods results of a pilot experimental study

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ABSTRACT

The need for reducing meat consumption in affluent countries is increasingly recognized as crucial to minimizing carbon footprint. However, confronting individuals with rational arguments can prompt emotional discomfort, which is often relieved by engaging in rationalization processes stabilizing current consumption patterns. Mindfulness research suggests that making people aware of their emotional reactions through introspection can reduce these rationalization processes.

In this mixed-method pilot experimental study, we inquired whether a single guided introspection, inspired by the micro-phenomenological interview technique, can alter individuals' experience of and abilities to deal with cognitive dissonance. Furthermore, we asked if such an intervention can stimulate attitude or intention changes concerning meat consumption. After inducing cognitive dissonance by exposing participants to pictures of the slaughter of a cow, the intervention group (n = 36) participated in the guided introspection, while the control group (n = 39) played solitaire. Self-report questionnaire measures of emotional discomfort, rationalization strategies, and attitudes towards meat consumption were administered before and after the intervention. Also, open-ended responses to participants' experience of the study were analyzed.

Quantitative results show significantly lower negative attitudes toward reducing meat consumption in the intervention group compared to the control group (partial $\eta^2 = 0.107$). Qualitative results indicate that these participants are more aware of negative emotions while engaging less in rationalization strategies. We conclude that our study indicates some potential for guided introspection to affect dissonance resolution and provide suggestions for future research.

1. Introduction

1.1. Reducing meat consumption

Throughout the last decades, meat consumption has received growing attention from scholars from various disciplines. While still controversially discussed (Ridoutt et al., 2012; Smil, 2013; Spiegel and Wynn, 2014; Lal, 2020; Rodgers and Wolf, 2020), leading scholars and international organizations attribute high levels of meat consumption a causal role in the emergence of direct health threats (e.g., obesity, cardiovascular disease, cancer, see Richi et al., 2015; Sanchez-Sabate and Sabaté, 2019), pressing environmental threats (e.g., climate change, fresh water use, deforestation, species extinction, see Poore and Nemecek, 2018; Schiermeier, 2019; Project Drawdown, 2020), and climate change induced health problems (Kotcher et al., 2021). Nevertheless, individual meat consumption remains high, especially in Western countries (Godfray et al., 2018). Reducing individual meat consumption is therefore considered a major lever for achieving global political agreements steering the future development of human society, such as the Sustainable Development Goals, the Paris Agreement, or the Convention on Biodiversity Goals.

In consequence, scholars have started to inquire into strategies with the potential to reduce demand for animal protein, thereby promoting a shift to plant-based foods. Several strategies have been suggested, such

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as demand-side policies, nudging, appeals to animal welfare, or changing communication toward meat eaters (Stoll-Kleemann and Schmidt, 2017; Reisch et al., 2021; Kwasny et al., 2022). Other approaches (e.g., educational approaches) follow a paradigm of an informed and reflexive consumer (McGregor, 2005). They aim at enabling individuals to make deliberate, self-determined consumer choices based on intrinsic values instead of being guided by unreflected routines, habits, and social conventions (Fischer et al., 2017). While the effectiveness of interventions to reduce meat consumption is an ongoing research question (Kwasny et al., 2022), such approaches aim to initiate changes at what Meadows and others have called the deepest leverage point of sustainability transformation (Meadows, 1999; Abson et al., 2017; Woiwode et al., 2021). They intend to support people in becoming aware of and overcoming the "great big unstated assumptions of a society" (Meadows, 1999, p. 16).

At first sight, providing information supporting a reduction of meat consumption seems to be a promising strategy for fostering deliberate, self-determined consumer choices. Many people seem to epitomize what has been called the meat paradox (Bastian and Loughnan, 2017; Dowsett et al., 2018; Buttlar and Walther, 2019; Rothgerber, 2020). It describes the widespread and cross-culturally prevalent phenomenon (Tian et al., 2016; Khara et al., 2021) that individuals hold moral concerns about consuming (some) animals yet continue to eat them. Especially in industrialized societies, this ambivalent relation to animals is less surprising than it might intuitively seem. As several researchers have pointed out, these societies are characterized by a systematic separation of animal products from their production, which makes the potentially problematic aspects of its consumption less salient to consumers (Fitzgerald, 2010; Pachirat, 2013) and explains why "consumers fail to link meat consumption with environmental issues or to consider its reduction a climate change mitigation option" (Kwasny et al., 2022, p. 1).

At the same time, most people are aware of the origins of animal products (Loughnan et al., 2014) and show increasing awareness of its potentially negative health and environmental impacts (Sanchez-Sabate and Sabaté, 2019). However, refraining from meat consumption in a society in which meat is a regular part of a diet is accompanied by a series of challenges, ranging from personal to socio-cultural, political and socio-economic ones (Frank, 2017). If people feel unable or unwilling to overcome these challenges, they will maintain their consumption choices despite the moral concerns they hold.

When individuals are confronted with their paradoxical relation to animals, or their inability to reconcile this paradox, they are likely to experience cognitive dissonance (Bastian et al., 2012; Dowsett et al., 2018; Rothgerber, 2020). Cognitive dissonance describes a negative arousal resulting from conflicting interests (Festinger, 1957; Cancino--Montecinos et al., 2020). The ideal self, who likes animals and acts in an ecologically and socially acceptable manner, stands in contrast to the individual's behavior consuming meat with its negative ecological impact and cruelty toward animals. The negative arousal resulting from this discrepancy threatens the person's self-esteem and, therefore, tends to be immediately reduced through, for example, rationalization and neutralization processes (Bastian et al., 2012; Jarcho et al., 2011; Piazza et al., 2015) and/or moral disengagement (Buttlar and Walther, 2019; Benningstad and Kunst, 2020). As a result, people adapt their beliefs by downplaying the negative impacts of meat consumption, thereby justifying and stabilizing their current eating behavior (Mandel et al., 2017).

For this reason, attempting to foster more deliberate, self-determined dietary consumption choices by making "rational appeals to people to change behavior based on factual and logical arguments" might be insufficient, if not counterproductive (Darnton and Evans, 2013, p. 13; see also Stoll-Kleemann and Schmidt, 2017).

1.2. Introspection and meat consumption

In search of approaches fostering self-determined consumption choices, Thiermann and Sheate (2020) have introduced the concept of experiential strategies, which "aim to physically, cognitively, and affectively stimulate meaningful experiences in relation to oneself, others and nature" (p. 7). An experiential strategy that has been suggested as a means to reduce meat consumption is mindfulness practice (Hunecke and Richter, 2019; Stanszus et al., 2019; Thiermann et al., 2020). Although current mindfulness research is characterized by conceptual ambiguity (Van Dam et al., 2018), in Western practice and science, mindfulness is most commonly defined as intentional, non-judgmental attentiveness to the present moment (Kabat-Zinn, 1990). Such practices have been increasingly discussed throughout the last decade both to promote conscious, healthy eating behaviors (Beshara et al., 2013; Kristeller and Epel, 2014) and to foster sustainable consumer choices (Ericson et al., 2014; Fischer et al., 2017; Sermboonsang et al., 2020).

While mindfulness practice is associated with a variety of effects, a main mechanism explaining the practice's potential for fostering sustainable consumer choices is the stimulation of introspective ability, that is, the ability to consciously observe one's subjective experience (Frank et al., 2019). Mindfulness meditation has been essentially described as an introspective practice in which awareness of internal processes such as thoughts, emotions, and bodily sensations is systematically cultivated (Chiesa and Malinowski, 2011; Grossman, 2018). This systematic introspection allows individuals to access inner states and processes that often remain unconscious (Tversky and Kahneman, 1974; Wilson, 2004). Research indicates that introspective practice can cultivate awareness for affective processes, enabling individuals to regulate their emotions in a self-determined way and engage with seemingly unpleasant emotional experiences instead of automatically reacting to them (e.g., Friese and Hofmann, 2016; Quaglia et al., 2015; Teper and Inzlicht, 2013). Therefore, it has also been hypothesized that the ability to introspect might carry a potential to address cognitive biases and rationalization processes as automatic reactions to the experience of cognitive dissonance (Barner and Barner, 2011; Jarcho et al., 2011; Holas and Jankowski, 2013). Consequently, an ability to introspect could establish an intuitive and affective approach to moral decision-making, as individuals can pay more attention to their emotional reactions and can adapt their actions accordingly (Grossman, 2014; Monteiro, 2016).

Against this backdrop, raising introspective awareness could also enable direct access to emotions, inner conflicts, and related mental strategies to resolve those conflicts occurring in relation to meat consumption. Increased awareness of the aversive emotional inner state of dissonance, which occurs as one is confronted with one's paradoxical relation to animals, could help to overcome strategies of rationalization. Such awareness would be a precondition for starting a self-determined, open-minded reflection on one's meat consumption and its implications, including considering reducing one's meat consumption. In sum, raising such introspective awareness could be a promising intervention fostering people's ability to make more conscious and reflexive dietary choices concerning animal products.

While mindfulness practices seem to be a good strategy to generally cultivate introspective awareness, a recent study found that such awareness might not necessarily be transferred to consumption-related behavior (Frank et al., 2021). There are at least two explanations for this finding: First, mindfulness meditation focuses on the present moment, and so are not usually related to consumption behaviors occurring in daily life. Therefore, it is not at all evident that individuals practicing mindfulness will cultivate awareness for the inner states and processes occurring when confronted with their ambivalent relation to meat products. Second, mindfulness is a personal practice that needs to be learned over time. Studies looking at single mindfulness interventions usually do not find the same effects that can be expected from continuous mindfulness practice (Larson et al., 2013; Thompson et al., 2021). In particular, transferring and applying it to specific domains of life, such as consumption, might take several years (Thiermann et al., 2020).

1.3. Interview approaches to access subjective experience

Seeking for an experiential intervention capable of raising introspective awareness of a specific, consumption-related situation without requiring extensive training, a look into recent developments in introspective research provides a promising alternative. Over the last 30 years, a plethora of scientific methods have emerged with the explicit aim to gather, analyze, and understand such subjective experience through interviewing. A prominent example is micro-phenomenology (Petitmengin, 2006; Valenzuela-Moguillansky and Vásquez-Rosati, 2019, but see for alternative methods for interviewing also explicitation interviews as outlined in Vermersch, 1999, descriptive experience sampling as described by Hurlburt and Akhter, 2006, or the phenomenological interview as described by Høffding and Martiny, 2016) Micro-phenomenology and related approaches share the assumption that a trained interviewer can guide even naïve interviewees to become aware of their lived experience and articulate it in fine-grained detail (see Petitmengin, 2006). Research in this field has also shown that after even a singular intervention of this kind, the participant can realize previously unattended aspects of their own experience. Such realization can leave significant traces in the interviewee, enabling them to start thinking differently about certain topics and practices or even find and try out new ways of thinking or acting (see, for example, Petitmengin, 2006; Petreca, 2016; Petitmengin et al., 2017).

Based on these insights, the objective of this pilot study is to explore whether a single guided introspection inspired by the micro-phenomenological interview technique can alter the individual's experience of and reactions to cognitive dissonance resulting from a confrontation with their paradoxical relation to meat consumption. Our study is guided by three hypotheses. We hypothesize that a single guided introspection following a visual confrontation with the origin of meat products will.

H1. reduce participants' tendency to engage in rationalization processes as a demonstrated reaction to such a confrontation,

H2. intensify the experience of negative affect, and

H3. induce changes in attitude or intention concerning meat consumption, including their expressed appetite as an important affective motivation for meat consumption (Kunst and Hohle, 2016).

2. Methods

2.1. Participants

Given its explorative character, this pilot study did not aim for a representative sample. We chose a population that could be expected to have general knowledge about the ethical implications of eating meat. Furthermore, guided introspections focusing on inner states and processes related to meat consumption cannot be simply applied to a general population. As guided introspections might inform knowledge exchange and information processes, such as in educational settings, we therefore decided to limit the pilot study to students. Targeting students is also likely to have a substantial societal impact, as this group will shape future discussions and public decisions to a large degree. For these reasons, limiting our sample to students seemed reasonable for the purposes of our study.

Out of the 76 participants recruited for the study, one incomplete dataset (second questionnaire missing) was excluded. The final sample consisted of 48 women and 27 men. Their ages ranged from 18 to 60 years ($M = 24.99$, $SD = 3.99$). Eighty-five percent were undergraduate students; 29.7% studied psychology as their major. All participants ate meat regularly (once per week or more). There were no significant differences in age, $t(73) = 0.11$, $p = .910$, gender, $\chi^2 = 0.89$, $p = .471$, or study subject, $\chi^2 = 2.73$, $p = .156$, between the conditions.

2.2. Design and procedure

Participants were recruited through the university participant pool as well as e-mail and poster announcements. Two participants were invited to each time slot and randomly assigned to either the intervention group (n = 36) or the control group (n = 39). Upon the participants' arrival, they were informed about the procedure and asked for their consent, seated in separate rooms equipped with laptops, and requested to fill out the first questionnaire on the laptop. Participants were first asked about their eating habits, their attitude towards meat consumption, mindfulness practices, and demographic information (age, gender, etc.). Then cognitive dissonance related to meat consumption was induced with a procedure adapted from Bastian et al. (2012) in both groups. Three pictures were shown separately to the participants with the instruction to take a close look at them (see appendix). The first picture showed a cow standing in a green meadow. In the second picture, a cow had just been slaughtered and lay headless on a bloody floor. The third picture showed a grilled steak nicely arranged on a plate. While participants could decide for how long they looked at the pictures, they needed to wait for at least 30 s before moving to the subsequent picture. Directly after being presented with the first picture participants were given the task of naming three ways animals resemble human beings. This was meant to address emotional separation from livestock raised for consumption being living creatures with the ability to have emotions and thoughts. The questionnaire ended with baseline measures of appetite, negative affect, rationalization strategies and motivation for and attitudes towards reducing meat consumption. During this time (approximately 10 min), the participants were left alone in the room.

After inducing cognitive dissonance, participants in the intervention group took part in a face-to-face interview inspired by the principles of micro-phenomenology (Petitmengin, 2006). The interviews were conducted by the fourth author of the paper. Initially, the interview followed the principles of micro-phenomenology, which diverges from the structured or semi-structured interview approaches by not following a predetermined question catalogue. Instead, the interview starts with the researcher inviting the participant to focus on the start of a singular past experience – in this case the first picture they were shown. The researcher helps the participant to re-evoke the first moment of the experience by asking them to take time to retrieve the temporal and physical context associated with this moment. When the experience is sufficiently present to the interviewee, the researcher asks the participant to report the course of events as remembered and then repeats the participant's report to allow for correction and supplementation of the record. After an initial timeline of the experience has been established in this way, the researcher then assists in retrieving further details by guiding the interviewee's attention to each reported moment, asking not only "what happened" but also "how exactly it happened" as part of the participant's experience. It is crucial that the researcher ask questions that are rigorously empty of content, that is, they only repeat the participant's utterances in their own words and ask for further details about the temporal sequence (What happened after this/before this?) and modality of the experience (How did this happen?). When the interviewer feels that the interview has exhausted the participant's recollection of the experience in its diachrony (different micro-phases) and synchrony (different modalities, such as perceptions, feelings and thoughts), they finish the interview. The micro-phenomenological procedure focuses on the evocation of a past moment and excludes encouraging the participant to interpret their experience or to further explore thoughts, images, or feelings that were not part of the target experience but came up during the interview. These guidelines for micro-phenomenology are meant to ensure the quality of an interview by producing an experiential report that is as little primed as possible by the interviewer's intervention.

Our interviews slightly diverged from this procedure. The interviewer also explores such interpretations and further experiences when they were mentioned by the participant during the interview if the

interviewer considered them relevant (though also without using a question catalogue).

The entire interview procedure, which was planned to take a maximum of 30 min, took on average around 20 min. These interviews were relatively brief compared to typical micro-phenomenological interviews, which can last up to 2 h or longer depending on the capacity of interviewer and interviewee. The interview was audio-recorded with the participant's consent.

To give participants in the control group the same amount of time between the induction of cognitive dissonance and the measurement of the dependent variables, they had the opportunity to distract themselves by playing solitaire on their laptop. This filler task was chosen because we expected it would not interfere with the automatic mental strategies of rationalization, which commonly follow the occurrence of cognitive dissonance (Jarcho et al., 2011; Mandel et al., 2017). After the intervention, participants of both groups were requested to fill out the same second questionnaire (7–8 min) containing measures of appetite, negative affect, rationalization strategies, and motivation for and attitudes towards reducing meat consumption. In addition, the second questionnaire contained open-ended questions for a qualitative analysis of participants' reactions to the cognitive dissonance induction and the effectiveness of the intervention ("How did you experience this study?" and "What did you feel when you saw the three pictures?"). Participants were then debriefed and awarded participant credits.

2.3. Measures

All data were collected by two questionnaires given to the participants in both intervention and control groups before and after the intervention. The main dependent variables were measured twice in both questionnaires.

Negative affect. The experience of negative affect was measured with seven items translated from Dolnicar et al. (2017), which were then combined to a mean. Participants were asked to indicate how they felt, first, after the induction of cognitive dissonance but before the intervention and, second, once again after the intervention ($\alpha = 0.86/.88$ for the baseline/dependent measure). Each item was answered on a 7-point scale (e.g., 1 = restless, 7 = calm).

Rationalization strategies. Fifteen items (Piazza et al., 2015) measured the strategies used to reduce cognitive dissonance on four dimensions "natural," "normal," "necessary" and "nice" (e.g., "It is only natural to eat meat" $\alpha = 0.85/.86$ for baseline/dependent measures). Participants rated each item on a Likert scale ranging from 1 (completely disagree) to 7 (completely agree). Participants also responded to five items ($\alpha = 0.79/.81$ for the baseline/dependent measures) that captured emotional connectedness to farm animals and the acknowledgment that they were capable of feeling and thinking, since these thoughts are repressed to justify personal meat consumption (Bastian et al., 2012). Higher levels of this measure, which we refer to as attribution of mind, thus indicate lower levels of rationalization.

Motivation for behavior change. Participants indicated on one item translated from Hoek et al. (2011) how much they intended to change their consumption of meat products in the near future. The scale ranged from 1 ("I would like to increase my meat consumption") to 5 ("I would like to give up meat consumption completely").

Attitudes toward reduction of meat consumption. The attitude towards the personal reduction of meat consumption was measured with four items, each on a 7-point semantic differential scale (e.g., 1 = beneficial, 7 = harmful). The items were translated from Hayley et al. (2015) and combined to a mean ($\alpha = 0.90/.84$).

Appetite. As a fifth dependent variable, a single dichotomous item ("Do you feel like eating the steak in the third picture?" yes/no) was asked once directly before the intervention and again after the intervention to capture the participant's appetite to eat the steak. The item targets the sensory component of taste in cognitive dissonance by asking the participant to imagine eating a steak. These questions were recoded into a single ordinal appetite change measure showing a decrease in appetite from yes to no (−1), no change (0), or an increase from no to yes (1) between the first and second measure.

Further characteristics of the sample. Participants ranked eight food categories (sweet pastries and sweets, fruits, vegetables, meat, fish and seafood, dairy products, eggs, cereal products) by the frequency with which they ate these food products. They also reported their meat consumption specifically on the item "How often do you eat meat?" The response scale ranged from 1 (not at all) to 5 (daily). The regularity and duration of personal mindfulness-based practices were collected using two dichotomous items designed to prevent distortion due to participants with meditation expertise. Participants reported whether they regularly practiced mindfulness exercises (yoga, meditation, tai chi, qi gong; at least once a week) and whether they had been practicing mindfulness exercises for more than 12 months. Respectively 13.8% (n = 5) and 7.7% (n = 3) of the participants reported practicing mindfulness-based exercises regularly and for more than a period of 12 months.

Open-ended measures of reactions. To allow for a qualitative analysis of intervention effects, participants were given three open feedback questions asking about their personal experience of the study, their feelings regarding the three pictures, and whether they wanted to share anything else they experienced during their participation.

2.4. Statistical analysis

To analyze the effect of the intervention on the main dependent variable rationalization strategies, we calculated one-way ANCOVAs in SPSS 26 (IBM Corp. Released, 2019) with the intervention group as a factor. We separately analyzed its effect on rationalization strategies, attribution of mind, affective arousal, attitudes towards reducing meat consumption, and motivation to reduce meat consumption after the intervention, while statistically controlling for the pre-intervention baselines. The intervention effect thus reflects the differences the interview makes to people above and beyond their initial level of the variable. The baseline effect reflects the extent to which the value measured before the intervention predicts the second measurement (it was expected to do so very well, as participant answers are usually relatively consistent in self-report measures). The distributions of the dependent variables in the two groups partially deviated from required normality. However, non-parametric RANCOVAs led to the same conclusions. Therefore, we report the more common ANCOVA procedure. Finally, we explore whether the intervention condition (dichotomous) is correlated to tendencies in appetite change (ordinal) by calculating their non-parametric correlation (Spearman's Rho).

2.5. Qualitative data analysis

Qualitative data analysis of the open questions was undertaken in four steps.

First, participants' responses were cleaned. For example, when responses to the second question were in the text field of the third question, these errors were corrected, and answers were attributed to the corresponding question. Furthermore, responses deemed irrelevant to answering the hypotheses were deleted. These included statements on the procedure of the study (e.g., "The selection of the pictures was very good") or general comments that could not be related to the hypotheses ("I would like to know and I will inform myself how bad it can be"). In this step, all answers to the third open-ended question allowing participants to make additional comments on the study were removed, as they did not contribute to answering the hypotheses of this study.

Second, following Elo and Kyngäs' (2008) approach to qualitative content analysis, the first and fourth authors of this article inductively developed a coding scheme based on a close reading of the responses. The scheme was elaborated in an iterative coding and refining process until 25% of the data was unambiguously and completely categorized in

accordance with the scheme (as suggested by Kuckartz, 2012).

Third, the first author and an independent research assistant applied the coding scheme to the entire qualitative data material in two rounds. Following the procedures of similar research projects (Campbell et al., 2013; O'Connor and Joffe, 2020), a first round of independent coding was followed by a meeting where differences were discussed, the coding scheme revised, and a second round of independent coding performed (see appendix for a detailed overview on the coding guidelines, as well as the final coding scheme). The final intercoder agreement was very high, reaching 95.2% agreement for the first and 95.8% for the second set of responses.

Fourth, the few ambiguous cases (seven in total) were also coded by the third author of the article, making final decisions in the statements' attributions to the categories.

2.6. Mixed methods

The study followed a mixed-methods triangulation design (Creswell, 1999). That is, we collected and analyzed quantitative and qualitative data independently from each other and relate the results in the discussion to provide a more holistic picture of the effects of the intervention.

3. Results

In this section, we will separately describe the quantitative (3.1.) and qualitative results (3.2.) of our study.

3.1. Quantitative results

The following analyses need to be interpreted with the sensitivity of the sample in mind. According to an analysis with G*Power (Faul et al., 2007), the sample can detect only large effects of $f = 0.33$ (or $\eta^2 = 0.098$) with a power of .80 ($\alpha = 0.05$) in a one-factorial ANCOVA with one covariate.

3.1.1. Rationalization strategies

The ANCOVA of rationalization showed only a non-significant trend for an effect of the factor intervention group, $F(1, 72) = 3.21$, $p = .078$, (partial) $\eta^2 = 0.043$ (see Table 1). The covariate – the pre-intervention baseline – was also highly significant, $F(1, 72) = 368.36$, $p < .001$, $\eta^2 = 0.836$. Participants who underwent the guided introspection tended to report lower rationalization of meat consumption (*EMM* = 3.08, *SE* = 0.06) compared to participants in the control group (*EMM* = 3.24, *SE* = 0.06). Attribution of mind is a more indirect indicator of (lack of) rationalization. There was no significant effect of the intervention on this variable, $F(1, 72) = 0.05$, $p = .826$, $\eta^2 = 0.001$; only the baseline measure predicted variance, $F(1, 72) = 672.82$, $p < .001$, $\eta^2 = 0.903$. The intervention and the control group both strongly attributed the ability to think and feel to farm animals, as the high means (>6.00 on a 7-point scale) in Table 2 show.

3.1.2. Experience of negative affect reactions

The ANCOVA shows no significant effect of the intervention, $F(1, 72) = 0.34$, $p = .563$, $\eta^2 = 0.004$, beyond the variance predicted by the baseline, $F(1, 72) = 57.56$, $p < .001$, $\eta^2 = 0.612$. The intervention group (*EMM* = 3.16, *SE* = 0.12) did not report more negative affect than the control group (*EMM* = 3.26, *SE* = 0.12).

Table 1
Effects of the intervention, controlling for variable baselines.

	$F(1, 72)$	p	$\eta^2_{partial}$
Negative Affect	0.34	.563	.004
Rationalization	3.21	.078	.043
Attribution of Mind	0.05	.826	.001
Negative Attitude Toward Reducing Meat Consumption	8.66	.004	.107
Motivation to Reduce Meat Consumption	0.34	.560	.005

Table 2
Raw means in quantitative measures by condition and measurement time.

	Time	Control (n = 39)			Intervention(n = 36)		
		M	*SD*	*d* [CI 95%]	*M*	*SD*	*d* [CI 95%]
Negative Affect	Pre	3.24	1.09	-.22	2.86	0.9	-.24
	Post	3.42	1.23	[-.54; .10]	2.99	1.02	[-.57; .10]
Rationalization	Pre	3.64	0.91	.55	3.14	0.81	.76
	Post	3.46	0.87	[.21; .88]	2.84	0.89	[.39; 1.12]
Attribution of Mind to Animals	Pre	6.02	0.89	-.06	6.02	0.93	-.13
	Post	6.03	0.80	[-.37; .26]	6.05	0.98	[-.46; .20]
Negative Attitude Toward Reducing Meat Consumption	Pre	2.54	1.24	-.88	2.58	1.39	-.55
	Post	3.49	0.85	[-1.25, −.50]	3.10	0.65	[-.89, −.19]
Motivation to Reduce Meat Consumption	Pre	2.85	0.87	-.22	3.03	1.00	-.28
	Post	2.92	0.87	[-.53, .12]	3.14	0.99	[-.60, .06]

3.1.3. Effects on tendencies to reduce meat consumption and appetite

There was no significant effect of the intervention on the motivation to reduce meat consumption, $F(1, 72) = 0.34$, $p = .560$, $\eta^2 = 0.005$, beyond the variance predicted by the baseline, $F(1,72) = 390.16$, $p < .001$, $\eta^2 = 0.844$. However, the ANCOVA of negative attitudes toward reducing meat consumption showed a significant effect of the intervention, $F(1, 72) = 8.66$, $p = .004$, $\eta^2 = 0.107$, beyond the variance predicted by the baseline, $F(1,72) = 48.33$, $p < .001$, $\eta^2 = 0.770$. The estimated marginal means of these attitudes were lower after the intervention (*EMM* = 3.09, *SE* = 0.10) compared to after the control task (*EMM* = 3.49, *SE* = 0.10). The means in Table 1 suggest an underlying pattern where the attitudes towards reducing meat consumption become more negative over the course of the dissonance regulation period induced by the experiment, but less so in the interview group.

We further looked at changes in appetite for the steak in the picture. Most participants reported the same appetite as before (82.1/80.6% in the control/intervention condition). However, only participants in the control condition reported an increase (7.7/0%) and less of them reported a decrease (10.3/19.4%, respectively) in appetite. The Spearman correlation between the condition (intervention coded as 1, control as 0) and appetite change is not significant though, $\rho = -0.197$, $p = .091$.

3.2. Qualitative results

The open question "How did you experience this study?" was answered by 32 participants in the intervention group (IG) and 31 in the control group (CG). Table 3 shows the categories that were inductively generated to summarize the responses, as well as their frequencies in the IGT and CG. In the IG, 6 participants (19%) described the study as direct and confronting ("I was obliged to deal with the origin of what I consume") but only 1 (3%) in the CG. In the IG, 15 participants (48%) reported that the study stimulated thinking and reflection on personal meat consumption ("This study made me thoughtful"), but only 7 (22%) in the CG. In the IG, 10 participants (32%) stated that they experienced negative emotions because of participating in the study ("Retrospectively, I feel somewhat uncomfortable and guilty, I feel desperate"), but only 3 (9%) in the CG. In the IG 13 participants (42%) and 10 (31%) in the CG gave positive feedback ("I experienced this study as very instructive") for the study itself or found it interesting or important to participate. Participants in the CG, in contrast, more frequently evaluated the study negatively, with "boring" (IG: 0 participants; CG: 3

Table 3
Categories for and frequencies of responses to the question "How did you experience this study?"

Codes	Intervention Group (n = 31)	Control Group (n = 32)
1. Direct and confronting	6 (19%)	1 (3%)
2. Stimulates reflection	15 (48%)	7 (22%)
3. Experiencing negative emotions	10 (32%)	3 (9%)
4. Feedback on the seminar	–	–
4.1. Positive feedback	13 (42%)	10 (31%)
4.2. Neutral/negative feedback	–	–
4.2.1. Boring	–	3 (9%)
4.2.2. Judgmental	3 (10%)	6 (19%)
4.2.3. Normal	1 (3%)	2 (6%)
4.2.4. Challenging/demanding	1 (3%)	2 (6%)
4.2.5. Confusing	1 (3%)	1 (3%)
4.2.6. Predictable	1 (3%)	–
4.2.7. Confirming	–	1 (3%)
4.2.8. Placative/provocative	2 (6%)	–
4.2.9. Irrelevant	–	1 (3%)
5. Provides justification	2 (6%)	5 (16%)

participants, 9%) and "judgmental" (IG: 3 participants, 10%; CG: 6 participants, 19%) being the most frequent attributions. In the CG, 5 participants (16%) provided justifications for their meat consumption as an answer to the open question, but only 2 (6%) in the IG (e.g.: "I usually only buy organic meat and if my budget allows it, I also intend to buy meat from local farmers from my region").

All 75 participants provided answers to the second open question "What did you feel when you saw the three pictures?" Table 4 shows the categories that were inductively generated to summarize the responses, as well as their frequencies in the intervention and control group. Overall, participants of both groups describe negative emotions prompted by the pictures (category A.1. and subcategories). Remarkably, however, participants in the intervention group would more frequently report continuous negative emotions when looking at picture 3 (IG: 19 participants, 53%; CG: 13 participants, 33%), whereas such emotions seem to be more often limited to the second picture in the CG ("I liked the cows on the meadow in the first picture because it seemed natural and original. The slaughtered cow left me shocked, although I'm familiar with these pictures because I have looked into this topic. The steak seemed delicious and didn't have the repulsive effect I had expected") (3 participants, 8%; 6 participants, 15%). Again, more participants in the CG (7) used the answer to provide justifications for their meat consumption, while only one person in the intervention group did so. Five participants (13%) in the CG and 3 participants (8%) in the intervention group did not describe their emotional experience but outlined thoughts on the experience.

Table 4
Categories for and frequencies of responses to the question "What did you feel when you saw the three pictures?"

Codes	Intervention Group(n = 31)	Control Group (n = 32)
A. Emotional reactions	3 (8%)	2 (5%)
A.1. Negative emotional reactions to picture 2	2 (5%)	7 (18%)
A.1.1. Continuing negative emotions at picture 3	19 (53%)	13 (33%)
A.1.2. No negative emotional reactions to picture 3	8 (22%)	8 (21%)
A.2. No negative emotional reactions to picture 2	1 (3%)	2 (5%)
B. Justification	1 (3%)	7 (18%)
C. Only thoughts on what is experienced	3 (8%)	5 (13%)

4. Discussion

Overall, our results neither unambiguously confirm nor disconfirm our hypotheses. In our first hypothesis, we predicted that a single guided introspection following a visual confrontation with the origin of meat products would reduce participants' tendency to engage in rationalization processes. Indeed, the qualitative findings suggest that those who did not participate in the interview had a stronger proclivity to provide rationalizations of their meat consumption and felt a stronger urge to do so. However, the statistical analysis only indicates a non-significant trend toward reduced rationalization strategies in the intervention group and thus no conclusive evidence. In our second hypothesis, we expected the intervention would intensify the negative affect participants experienced when engaging with the pictures. Again, the qualitative results indicate that participants experienced higher levels of negative affect, whereas the quantitative findings do not find any significant changes in negative affect. In our third hypothesis, we predicted that the intervention would stimulate changes in attitude or even intention concerning meat consumption, including participants' expressed appetite. Our results showed that the guided introspection led to significantly lower negative attitudes towards reducing meat consumption, although both groups showed higher negative attitudes after exposure to the pictures. No significant effects of the intervention were found on participants' intentions to consume meat. Participants' appetite for the steak in the picture did not significantly change either.

The absence of statistically significant effects on rationalization processes and the experience of negative affect does not support our hypotheses. This absence of a significant finding could either reflect that a brief introspective interview does not impact these reactions, or that its effect is too small or noisy to be identified with our small sample. Similar to findings in mindfulness research, the interview might only have a small or no effect because the ability to introspect must be systematically trained for a longer period of time (Thiermann et al., 2020). In other words, a guided introspection, contrary to its claims, cannot compensate for a participant's poorly developed ability to introspect. Another possible explanation is that although the guided introspection provides access to the subjective experience of negative affect (Petitmengin, 2006), it does not help to endure or regulate this experience. Therefore, after the intervention both groups still engage in rationalization processes to relieve their continued emotional discomfort. This explanation is in line with findings from mindfulness research, according to which emotional regulation usually increases proportionally to the practitioner's level of experience and hence needs to be learned too (Heppner et al., 2015). From this perspective, a confrontation with one's emotional state does not have to intensify the unpleasant experience (as suggested in hypothesis 2). In both groups, rationalization may serve as an automatic emotional regulation process (Cancino-Montecinos et al., 2020) because alternative ways to cope with the experience are not available for the participants. This interpretation is also supported by the finding that both groups showed higher negative attitudes toward meat reduction, suggesting that rationalizations stabilize prevalent consumption practices (Bastian et al., 2012; Piazza et al., 2015; Mandel et al., 2017).

Especially the qualitative findings, however, provide some evidence to argue that the guided introspection did affect individuals' engagement in rationalization processes and their awareness of negative emotions. Those individuals not participating in the guided introspection would more frequently provide post-hoc justifications for their meat consumption and reported less negative emotions, especially when looking at the steak picture (following the picture of the slaughtered cow). The differences between the qualitative and quantitative findings on affect and rationalization might be due to differences in the broadness of the constructs and the individuality of content measured with open-ended formats versus rating scales. For example, buying organic meat was an exemplary justification in the qualitative analyses but there was no quantitative item to capture this specific form of dissonance

reduction.

Conversely, individuals in the intervention group described their participation more often as direct, confronting, and thought-provoking, more often reported negative emotions as a result of study participation and evaluated the study on average more positively than the control group. These findings are in line with recent research from environmental and sustainability education, indicating that offering students the opportunity to express the emotional challenges they face regarding current unsustainability alone can help them deal with these challenges in a more constructive, solution-oriented way (Ojala, 2013, 2016; Mälkki and Raami, 2019).

The statistically significant lower negative attitudes towards reducing meat consumption among the intervention group corroborates this interpretation. As outlined in the introduction, the rationale underlying experiential practices is that it provides an intuitive, affective approach to moral decision-making (Grossman, 2014; Monteiro, 2016; Thiermann and Sheate, 2020). In other words, more attention is paid to the pre-reflexive (Petitmengin, 2006) emotional reaction that is prompted, for example, by confronting the implications of one's meat consumption. While most participants in the study might still engage in rationalization processes, for the intervention group, rationalization might work less well to soothe the unpleasant affect experienced when confronted with the origins of meat consumption, hence also resulting in lower negative attitudes toward reducing meat consumption.

In sum, the results of our study do not ultimately answer whether a single guided introspection affects individuals' tendency to engage in rationalization processes, intensifies the experience of negative affect, or consistently increases attitudinal facilitators of reducing meat consumption. More research is needed to investigate the hypotheses we have proposed and better understand the mechanisms occurring during introspective interventions. Our study indicates, however, that focusing on the affective experience underlying the meat paradox might carry potential to stimulate deeper reflections on one's meat consumption. In particular, our study provides evidence that such an intervention can prevent individuals from rejecting behavior changes, an attitude for which dissonance reduction strategies are thought to be a major cause.

Given that the experience of cognitive dissonance and the resulting psychological coping mechanisms are equally relevant for other unsustainable consumption behaviors (Mandel et al., 2017; Brosch and Steg, 2021), we think that the research we have piloted here is worth being further pursued more broadly in sustainable consumption research. If future studies confirm the hypotheses of our study, these findings will be a significant contribution to our knowledge about sustainability change processes (for example, in education). They suggest that an explicit focus on the emotional experience of one's own consumption can reduce the activation of automatic coping mechanisms leading to the rejection, devaluation or denial of information emphasizing the unsustainable impacts of one's consumption behaviors (Brosch and Steg, 2021).

5. Limitations and implications for future research

We consider the following four limitations of our research as most relevant. First, our study is based on the assumption that meat consumption poses a moral concern for individuals because of its ethical and environmental dimensions. Despite general agreement on the detrimental impacts of industrialized livestock production and high meat consumption, however, both the public and scholarly discourse on meat production and consumption in general remains somewhat controversial (Ridoutt et al., 2012; Smil, 2013; Spiegel and Wynn, 2014; Lal, 2020; Rodgers and Wolf, 2020). We think this controversy strengthens the value of our study. Most consumption behaviors are so-called wicked problems and the assessment of their environmental, social, economic and health impacts is uncertain (Davies et al., 2010). For this reason, different scholars (e.g., di Giulio et al., 2014; Fischer et al., 2017; Geiger et al., 2018) have suggested distinguishing between the impact of consumption behaviors and their underlying intentions as criteria of their sustainability. Regardless of the specific consumption behavior and its impact, cognitive dissonance and its psychological coping mechanisms are processes that (a) keep individuals from putting their intentions into practice, and (b) influence how individuals perceive the impact of their consumption behaviors, and thereby also their intentions (Brosch and Steg, 2021). Strategies to constructively reflect on and deal with such coping mechanisms are hence crucial for confronting unpleasant evidence and aligning one's intentions toward this evidence, especially if it remains controversial.

The second limitation concerns the representativity of our sample. Our sample was relatively small, only yielding sufficient statistical power to detect large effects of the intervention that explain almost 10% of the variance. Smaller yet still relevant effects (e.g., slighter decreases in rationalization) may remain undetected. Also, the high overall percentage of women in the sample might have affected our findings. Even though the gender distribution did not differ between conditions, differences in meat consumption can be explained by gender (Rosenfeld and Tomiyama, 2021), so that gender differences might have played a role in the effectiveness of the intervention too. Furthermore, the sample consisted of students at a university with a strong focus on sustainability. It is likely that they have a greater awareness of the problematic implications of animal products, and that they already consume less meat than the average German (Statista, 2022). It could also be that a student population in general and our sample in particular are more open to the kind of intervention examined in this study. Even though this sample might thus be a well-suited target group for applications of such an intervention, its generalizability to the general population would require further research with larger sample sizes, heterogeneous populations and a more balanced gender ratio.

Third, the interview procedure was inspired by methods of guided introspection and in particular micro-phenomenology. As a result, the interviewer focused on helping the participant to explore their lived experience of seeing the three pictures presented in the questionnaire. However, the procedure diverged from a micro-phenomenological interview as the interviewer also considered experiences as they arose in the interview, thus not first exploring the past experience and then the present experience. Furthermore, the interviews were relatively short, possibly impeding the introspective process a full micro-phenomenological interview can unfold. A more experienced interviewer might also have more consistently applied other principles of micro-phenomenology, such as the use of content-free questions and quote reformulation. A future study could aim at using a stricter micro-phenomenological design to ensure that participants become aware of their own authentic past experience as effectively as possible.

Fourth, our study was based on the rationale that the focus on emotional processes, instead of engaging in a discussion, when confronted with the origins of animal products might help to avoid rationalization processes. However, we did not directly compare the effects of the guided introspection with the effects a discussion (or any other kind of interaction with the topic) could elicit. Instead, the control group performed an unrelated activity (playing solitaire). An alternative design for future studies could therefore be to expose participants of the control group to reason-based arguments promoting reduced meat consumption (e.g. reading an article).

Despite these limitations, the findings of this study provide preliminary insights into a promising area of research on fostering sustainable consumption. To close the admittedly still large gaps in knowledge about the effectiveness of such interventions, we propose three types of research.

First, future research should extend quantitative measures of rationalization. As we have argued, the discrepancy between the non-significant quantitative changes in rationalization and the qualitative findings suggest that the scales we applied do not sufficiently cover the rationalization strategies activated by people to justify their meat consumption.

Second, we suggest examining the various mechanisms that could

influence an intervention like ours. As mentioned in the discussion, it might well be possible that the intervention raised participants' awareness of their negative emotional reactions yet did not develop their ability to maintain these emotions, which is why they engaged in rationalization processes. In particular, future research should also focus on the mediating role of emotional regulation as a precondition for avoiding rationalization processes.

Third, the practical value of our study is assessing whether a focus on lived emotional experience, in comparison to reason-based discussion, related to one's unsustainable consumption can stimulate more deliberate, self-determined reflection on this behavior. Instead of applying one single introspective intervention, future studies could be built around a longer intervention program, for example, comparing repeated confrontations with the origin of meat products accompanied by introspective practice with confrontations followed by a short discussion. While such a scenario would bring new challenges and limitations (e.g., clearly isolating the effects of the introspective intervention from other influence factors), it would also more strongly connect to the practical application of this kind of intervention, for example, in educational contexts.

6. Conclusion

In this experimental mixed-methods pilot study, we inquired whether a single guided introspection inspired by the micro-phenomenological interview technique would alter individuals' experience of and ability to deal with cognitive dissonance resulting from a confrontation with their paradoxical relation to animals. Furthermore, we asked if such an intervention can stimulate attitude or intention changes concerning meat consumption.

Quantitative results show a significant decrease in negative attitudes toward reducing meat consumption and a marginally significant reduction of rationalization in the intervention group. Qualitative results indicate that these participants are more aware of negative emotions and engage less in rationalization strategies. Overall, the results neither unambiguously confirm nor disconfirm our hypotheses.

Our study indicates, however, that focusing on the affective-emotional experience underlying the meat paradox might carry potential for supporting deeper reflections on one's meat consumption. Given that the experience of cognitive dissonance and the resulting psychological coping mechanisms are equally relevant for other unsustainable consumption behaviors, we therefore think that the research we have piloted here should be pursued in sustainable consumption research. For this purpose, future studies should work with larger, more representative sample sizes, extended introspective interventions, and more applicable research contexts.

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Conflict of interest

None.

Author contributions

PF: Designed and supervised the study, lead the qualitative analysis, and wrote the paper; KH: Participated in the data analysis and in writing the paper; VK: Co-designed and conducted the study, collected the data, and participated in writing the paper; CS: Co-supervised the study, lead the quantitative analysis, and participated in writing the paper.

Ethical statement

The Leuphana University of Lüneburg Ethics committee approved the research procedure in accordance with the provisions of the Declaration of Helsinki. All participants provided informed consent before participating in the described studies.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.clrc.2022.100070.

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