Appetite 186 (2023) 106537

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

Gradual behaviour change towards meat reduction: Development and validation of a novel decisional balance scale

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ARTICLE INFO

Handling Editor: Jennifer Temple

Keywords:
Behaviour change
Meat reduction
Decisional balance
Food decision making
Stages of change

ABSTRACT

Meat reduction is gaining attention among consumers, marketers, policymakers and scientists. Yet little is known about decision-making processes and behaviour change towards meat reduction. This paper explores the applicability of the decisional balance (DB) framework to the field of meat reduction. A novel DB scale to measure the perceived importance of beliefs about meat reduction at different stages of behaviour change was developed and validated in two studies with German meat eaters. In Study 1 ($N = 309$), the item inventory was tested using an exploratory factor analysis and then validated in Study 2 ($N = 809$). The results yielded two higher-order DB factors (pros and cons), which were subdivided into five lower-order factors (perceived benefits of a plant-based diet, downsides of factory farming, health barriers, legitimation barriers and feasibility barriers). The pros and cons were summarised in a DB index. All DB factors and the DB index were tested for internal consistency (Cronbach's alpha $\geq$.70) and aspects of validity. The typical DB pattern of the pros and cons of behaviour change was confirmed: the cons outweighed the pros for consumers who did not intend to reduce meat consumption, while the pros outweighed the cons for consumers who intended to reduce meat consumption. The new DB scale for meat reduction has proven to be a suitable measure to gain insights into consumers' decision making and could be used to develop targeted meat reduction interventions.

1. Introduction

In recent years, meat reduction has been a frequently discussed topic in the media. Various reports call for a change in consumer behaviour towards lower consumption of animal products, especially meat, to mitigate the negative impacts of high meat consumption on the environment, animal welfare and human health. As a result, a new dietary form called flexitarianism has emerged in Western society. According to Dagevos (2021), flexitarians (or meat reducers) consciously decide to shift away from excessive meat consumption by gradually reducing their meat intake. Flexitarians show increased awareness of the negative environmental and health-related impacts of high meat consumption. A consumer survey conducted with 2049 German consumers in 2019 found that 20% of men and 34% of women practice a flexitarian diet (YouGov, 2019). Nevertheless, the average annual meat intake in Germany barely decreases and remains high, at 55 kg per capita in 2021 (BMEL, 2022). What prevents German consumers from changing their meat-eating behaviour, and based on which beliefs do they decide to eat less meat?

Meat reduction is gaining attention not only in society and the economy but also in the scientific community. However, current knowledge of consumers' specific attitudes and beliefs towards meat reduction is still limited. Scientists are investigating ways to convince consumers to reduce their meat consumption and adopt a more plant-based diet. One possible way could be through analysing motivators for and barriers to meat reduction and then developing targeted appeals for meat reduction. This paper builds the foundation for this approach by studying beliefs about meat reduction and meat consumption more closely.

2. Enablers and barriers to a lower-meat diet

Over the past 20 years, a considerable number of studies have examined enablers and barriers to meat reduction. Consumers reduce meat consumption for different reasons (Dagevos & Voordouw, 2013; De Boer, Schösler, & Aiking, 2017) and can hold multiple positive and

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https://doi.org/10.1016/j.appet.2023.106537
Received 20 September 2022; Received in revised form 12 February 2023; Accepted 8 March 2023
Available online 17 March 2023
0195-6663/

negative beliefs about meat simultaneously (Collier, Normann, Harris, Oberrauter, & Bergman, 2022). Depending on the individual's attitude, various motivational factors (e.g., health) can be both enablers and barriers to reducing meat consumption, and studies have begun to discuss the tensions between them (Stea & Pickering, 2019). Table 1 shows examples from the literature of such two-sided motivational aspects in meat reduction.

Several studies have identified **health** as a major reason both to eat meat but also to moderate its consumption (Collier et al., 2022; de Boer et al., 2017). On the one hand, meat is considered healthy and an important source of nutrients (Backer & Hudders, 2014; Kemper & White, 2021; Lea & Worsley, 2003). On the other hand, meat consumption is considered unhealthy; it is suspected that high meat consumption is linked to type 2 diabetes, cardiovascular disease or cancer (Boada, Henríquez-Hernández, & Luzardo, 2016; Geiker et al., 2021). Furthermore, the belief that meat is needed for muscle growth (Rothgerber, 2013) keeps consumers stuck to meat consumption, while beliefs about weight control (e.g., that meat and meat products can have negative health effects because they are high in fat) encourage them to reduce their meat intake (Lea & Worsley, 2003). Such ambivalent beliefs can create inner tensions that influence a consumer's decision-making process for behaviour change.

Compared to health beliefs, the literature tends to agree that **environmental concerns** and awareness of the environmental impact of meat are strong enablers for meat reduction (Carlsson, Frykblom, & Lagerkvist, 2007; Collier et al., 2022; Hielkema & Lund, 2021; Whitmarsh & O'Neill, 2010). Yet, many consumers do not reduce their meat consumption because they are unaware of the link between excessive meat consumption and environmental degradation (Collier et al., 2021; Pohjolainen, Tapio, Vinnari, Jokinen, & Räsänen, 2016), underestimate the impact of meat production on the environment (De Boer, Schösler, & Boersema, 2013; Hartmann, Furtwaengler, & Siegrist, 2022) or lack knowledge of environmental impacts related to meat consumption (Hartmann, Lazzarini, Funk, & Siegrist, 2021).

After health and environmental concerns, **animal welfare concerns** and moral issues are the third-most reported enabler for a plant-based diet among meat reducers (Sanchez-Sabate & Sabaté, 2019; Schösler, Boer, & Boersema, 2014; Tobler, Visschers, & Siegrist, 2011). Consumers who care about animal welfare and rights and do not support conventional meat production are more likely to reduce their meat intake. Research on vegetarianism and veganism has shown that ethical concerns around animal welfare are the most important reason for meat renunciation (Lea & Worsley, 2003; Ruby, 2012). In contrast, meat eaters can experience cognitive dissonance when thinking about animal welfare issues and animals being a meat (Festinger, 1957; Loughnan, Haslam, & Bastian, 2010). To resolve this psychological state of discomfort, meat eaters apply meat-eating justification strategies or simply avoid information about animal suffering in meat consumption, which in turn acts as a barrier to meat reduction (Bouwman, Bolderdijk, Onwezen, & Taufik, 2022; Bryant et al., 2022, 2022, 2022; Hartmann & Siegrist, 2020; Kwasny, Dobernig, & Riefler, 2022; Rothgerber, 2013).

Several studies have identified **taste** as a strong barrier to meat reduction (Boer, Hoogland, & Boersema, 2007; Corrin & Papadopoulos, 2017; Graça, Calheiros, & Oliveira, 2015; Lea & Worsley, 2003; Piazza et al., 2015; Schenk, Rössel, & Scholz, 2018). Consumers experience pleasure from eating meat and value the sensory properties of meat (Collier et al., 2021; Kwasny et al., 2022). In turn, Schenk et al. (2018) argued, taste could also be treated as an enabler for meat reduction. Consumers might reduce their intake of meat because they like the taste of meat-free meals or they dislike the taste of meat (Schenk et al., 2018). Additionally, Michel, Hartmann and Siegrist (2021) reported that positive taste expectations of plant-based foods increasingly motivate consumers to reduce their meat consumption. In another study, Belgian consumers indicated that plant-based meat alternatives were perceived as improving over time and increasingly meeting their needs, with a significant increase in satisfaction from 44% in 2019 to 51% in 2020

Table 1
Enablers and barriers to meat reduction (literature review).

Category	Enablers to reduce meat consumption (examples)	Barriers to reduce meat consumption (examples)
Health	Beliefs about positive health effects of plant-based diet (de Bakker & Dagevos, 2012; Lea & Worsley, 2003) Prevent deseases (e.g., heart disease, cancer, type 2 diabetes) (Lacroix & Gifford, 2019; Lea et al., 2006) Weight control (Lea & Worsley, 2003)	(Frequently) eating meat is necessary to be healthy (De Boer et al., 2017; Piazza et al., 2015) Meat is essential for strong muscles (Rothgerber, 2013) Nutritional necessity of meat (Cheah et al., 2020; Lea & Worsley, 2003; Salonen & Helne, 2012) Nutritional deficiency of vegetarian diet (Barnard, Nicholson, & Howard, 1995) Red meat provides rich source of high biological value protein (Wyness, 2016)
Ecological welfare	Environmental concern and awareness about negative impact of meat production (Cordts, Nitzko, & Spiller, 2014; Dagevos & Voordouw, 2013; Whitmarsh & O'Neill, 2010) More ressource-efficient to produce plant-based foods (Lacroix & Gifford, 2019; Mullee et al., 2017) Reduce climate change (Hielkema & Lund, 2021) Cattle farming has negative impacts on the planet (Schösler et al., 2015)	Lack of knowledge about environmental impact of meat consumption (de Boer et al., 2017; Pohjolainen et al., 2016; Collier et al., 2021) Sceptical about climate change and not caring for environmental protection (De Boer et al., 2013) Perceived lack of responsibility to change and lack of effectiveness of meat avoidance as mitigating climate change (Bohm et al., 2015; de Boer et al., 2017; Hielkema & Lund, 2021; Mullee et al., 2017)
Animalwelfare	Prevent animal suffering (Lacroix & Gifford, 2019; Lea et al., 2006; Cordts et al., 2014) Concern around animal suffering in livestock farming (Sachez-Sabate & Sabaté, 2019) Animals need to be killed for food (de Backer & Hudders, 2014) Caring about animals (de Boer et al., 2017; Mylan, 2018; Ruby, 2012; Tobler et al., 2011) Feeling psychological discomfort due to moral issues of meat eating (Pohjolainen et al., 2015; Hartmann & Siegrist, 2020; Bryant et al., 2022; Bouwman et al., 2022)	Beliefs about animals do not feel pain the same way humans do (Rothgerber, 2013) Avoiding information about the negative impacts of meat production on animals (Festinger, 1957; Kwasny et al., 2022; Loughnan et al., 2010)
Taste/Meat enjoyment	Dislike the taste of meat (Schenk et al., 2018) and eating meat in general (De Boer et al., 2017) Feeling disgust for meat (Graça et al., 2015) Positive taste expectations of plant-based foods (Hartmann & Siegrist, 2020) Plant-based meat alternatives increasingly meet consumer needs (Bryant & Sanctorum, 2021) Interested in trying new foods and meals (Hoek et al., 2011; Mullee et al., 2017)	Good taste of meat (Lea & Worsley, 2003; Piazza et al., 2015; Schenk et al., 2018) Meat adds much flavour to a meal (Piazza et al., 2015) Sensory enjoyment of eating meat (Collier et al., 2021) Enjoy eating meat (Kwasny et al., 2022), one of the good pleasured in life (Graça et al., 2015) Meals without meat would just be bland and boring (Piazza et al., 2015) Food neophobia, fear of trying new foods (Vanhonacker, van Loo, Gellynck, & Verbeke, 2013) Strong meat attachment (Graça et al., 2015)

(*continued on next page*)

Table 1 (*continued*)

Category	Enablers to reduce meat consumption (examples)	Barriers to reduce meat consumption (examples)
Social approval/ norm	Eating meat is unfashionable (Cordts et al., 2014) Social networks with meat reducers and meat avoiders (Hodson & Earle, 2018; Lacroix & Gifford, 2019; Stoll-Kleemann & Schmidt, 2017) Expected approval by others who eat less or no meat (Schenk et al., 2018)	Fear of social stigma among friends and family when choosing vegetarian dishes (Markowski & Roxburgh, 2019; Cordts et al., 2014) Vegetarian (or vegan) meals are not suitable for special occasions like Christmas, BBQ etc. (Hielkema & Lund, 2021) Eating meat as a sign of beaing wealthy (Piazza et al., 2015) Social network/others in the household eat meat (De Boer et al., 2017), lack of social support (Hodson & Earle, 2018) Meat is socially construed as central in food practices (Bohm et al., 2015; Hoek et al., 2011)
Convenience/ Comfort	Vegetarian or plant-based diets reduce the available dishes to choose from (Lea et al., 2006; Lea & Worsley, 2003; Schenk et al., 2018)	Preparation of vegetarian or plant-based meals takes more time than preparing meat dishes (Corrin and Papadopoulos, 2017; Pohjolainen et al., 2015; Hoek et al., 2011)
	Feeling fine with a meatless diet (Graça et al., 2015; Lacroix & Gifford, 2019)	Limited options of vegetarian foods outside the home (Cheah et al., 2020; Lea & Worsley, 2003; Mullee et al., 2017; Salonen & Helne, 2012) Feeling sad if forced to stop eating meat (Graça et al., 2015) Go food shopping more often when making vegetarian meals (Lacroix & Gifford, 2019; Lea et al., 2006) Eating meat feels right (Hielkema & Lund, 2021) In most social situations, it is easiest to eat meat (Hielkema & Lund)
Self-efficacy/ Abilities	Perceived ease to replace meat (Hoek et al., 2011; Kemper, 2020; Michel et al., 2021)	Lack of knowledge about vegetarian diets (Salonen & Helne, 2012; Cheah et al., 2020) Uncertainty in how to replace meat in meals (Collier et al., 2021; Elzerman et al., 2013; Kemper, 2020) Lack of cooking skills to prepare meat-free dishes (Corrin & Papadopoulos, 2017; Hagmann, Siegrist, & Hartmann, 2019; Lea et al., 2006)
Finance	Meat is costlier than many other groceries (Schenk et al., 2018; Charlebois, McCormick, & Juhasz, 2016)	High costs to make vegetarian food (Hodson & Earle, 2018; Lacroix & Gifford, 2019) Varied and balanced plant-based or vegetarian diets requires purchasing high-quality vegetables and/or meat substitutes (Hoek et al., 2011; Leitzmann, 2014; Sanchez-Sabate & Sabaté, 2019)
Habit/Identity	Increasing familiarity with plant-based foods (Onwezen et al., 2021) Self-identity as a vegetarian (De Boer et al., 2017; Oyserman, Smith, & Elmore, 2014; Schenk et al., 2018) Repeated exposure to meals with meat substitutes (Hoek et al., 2011)	Eating vegetarian/vegan does not suit people like me (Hielkema & Lund, 2021) Eating meat fits well with what I normally eat (De Boer et al., 2017) Brought up with meat (Klöckner, 2013; Cheah et al., 2020) Meat as part of own culture (Graça et al., 2015), self-identity as a meat-eater (Carfora et al., 2017)

(Bryant & Sanctorum, 2021). Nevertheless, most consumers have perceived taste as a barrier and not as an enabler to meat reduction (Ruby, 2012).

In recent years, information about plant-based and low-meat diets has gained attention in the media, and with it **social** acceptance of these new dietary forms (Schenk et al., 2018). However, the literature on social approval of meat reduction has revealed mixed findings. While studies have shown that social networks with meat reducers and avoiders encourage meat reduction (Stoll-Kleemann & Schmidt, 2017), others have concluded that significant others can be a barrier to behaviour change too (Cheah, Sadat Shimul, Liang, & Phau, 2020; Wyker & Davison, 2010). For example, fear of social stigma among friends and family when choosing a vegetarian dish can prevent meat reduction (Bohm, Lindblom, Åbacka, Bengs, & Hörnell, 2015; De Boer & Aiking, 2011; Markowski & Roxburgh, 2019; Schösler, de Boer, Boersema, & Aiking, 2015). Moreover, former meat avoiders have identified lack of social support as a barrier when they were following a plant-based diet (Hodson & Earle, 2018). Additionally, specific beliefs such as vegetarian (or vegan) meals not being suitable for special occasions like Christmas, a barbeque or dinner at a restaurant are further hindrances to a plant-based diet within social settings (Hielkema & Lund, 2021; Michel, Hartmann, & Siegrist, 2021).

Ability-related barriers to meat reduction include lacking knowledge of how to practise a vegetarian diet (Cheah et al., 2020; Lea & Worsley, 2003; Salonen & Helne, 2012), uncertainty in how to replace meat in meals (Collier et al., 2021; Elzerman, van Boekel, & Luning, 2013; Kemper, 2020) and deficient cooking skills to prepare meat-free dishes (Hagmann, Siegrist, & Hartmann, 2019; Lea, Crawford, & Worsley, 2006). In this context, meat eaters often perceive **convenience** as a barrier to meat reduction because they believe that preparation of vegetarian or plant-based meals takes more time than that required for meat dishes (Macdiarmid, 2022; Pohjolainen, Vinnari, & Jokinen, 2015). Convenience could theoretically also be perceived as an enabler for meat reduction because vegetarian or plant-based diets may reduce the number of available dishes to choose from (Lea et al., 2006; Schenk et al., 2018).

Furthermore, a refusal to change one's eating **habits** has been acknowledged as a strong barrier to meat reduction (Cheah et al., 2020; Rees et al., 2018). Like other habitual behaviours, eating meat is a frequently repeated and mostly automatic response to specific stable situations, often highly influenced by environmental cues (Klöckner, 2013; van't Riet, Sijtsema, Dagevos, & Bruijn, 2011; Verplanken & Aarts, 1999). However, a systematic review by Onwezen et al. (2021) on consumer acceptance of alternative proteins showed that familiarity with plant-based foods is increasing, which could lead to more habitual adoption of plant-based diets in the future.

Regarding pecuniary **costs**, evidence is still scarce and conflicting (Schenk et al., 2018). While Schenk et al. (2018) suggested financial aspects as an enabler for meat reduction because meat can be more expensive than many other foods, Leitzmann (2014) argued that people may believe that a varied and balanced plant-based or vegetarian diet requires purchasing high-quality vegetables and/or meat substitutes. This belief could be due to the very low cost of meat in many countries. Meat substitutes, on the other hand, can be more expensive than meat.

Further barriers to a shift towards a more plant-based diet are high food neophobia (Jahn, Furchheim, & Strässner, 2021), identity incongruence (Hielkema & Lund, 2021) and strong stereotype beliefs, such as that eating vegetarian is feminine and eating meat is masculine (Rosenfeld & Tomiyama, 2021).

In previous studies, the exploration and discussion on enablers and barriers to meat reduction primarily focused on analysing *why* consumers do or do not reduce meat consumption rather than *how* they change their meat-eating behaviour. While eating meat is often the default in Western society, meat reduction requires consumers to make a conscious choice based on specific beliefs about dietary change. Looking at the decision-making process towards meat reduction, based on which beliefs do consumers decide to reduce their meat consumption? And which beliefs may prevent them from changing their meat consumption? So far, little is known about consumers' belief structure regarding a dietary change towards eating less meat and how consumers balance those beliefs during their decision-making process towards meat reduction.

3. The role of decisional balance in behaviour change towards meat reduction

Meat reduction is a decisive, gradual shift away from higher meat consumption. The present research aims to shed light on behaviour change towards meat reduction by means of the transtheoretical model (TTM) of behaviour change (Prochaska & Velicer, 1997). The TTM integrates principles and processes of change from across leading theories and provides insights into behaviour change through six stages (Prochaska & DiClemente, 1983; Prochaska & Velicer, 1997). In the first *pre-contemplation* stage, the individual is unaware (or insufficiently aware) of the need to change the current (problematic) behaviour and thus does not consider any change. In the *contemplation* and *preparation* stages, the individual develops the intention to change. While in the *contemplation* stage, the individual begins recognising their behaviour as problematic and starts thinking about possible pros and cons of a behaviour change, but they have not yet decided to change. When entering the *preparation* stage, the individual has made the decision to change, is preparing to do so, but has not yet taken any action. In the fourth *action* and fifth *maintenance* stage, the individual performs the behaviour change by taking specific steps to modify their behaviour (action) and then sustains the new behaviour over time (maintenance). However, Prochaska and DiClemente also mentioned that there is always a risk of *termination,* i.e., that the individual will not be able to maintain the desired behaviour and relapse to the old behaviour. Each stage of change is characterised by different beliefs related to making a change, and the individual can cycle through the stages several times before successfully remaining in the maintenance stage.

A few studies have used the TTM to explain shifts in meat consumption (Hielkema & Lund, 2021; Tobler et al., 2011; Wolstenholme et al., 2021; 2021) or meat avoidance (Bryant et al., 2022; Mendes, 2013). For example, in a recent study, Bryant et al. (2022) identified stage-specific social and psychological barriers to veganism and discussed possible ways to overcome them. They concluded that is important for animal advocates to be aware of these stages and their associated barriers because people in different stages might need different approaches to convince them of veganism (Bryant et al., 2022). However, these approaches may differ from those for meat reduction.

In general, practicing a flexitarian diet might be easier for consumers than eliminating meat completely from their diet, because meat reduction is perceived as a less radical behaviour change than becoming, for example, vegan. By applying the TTM to meat reduction, we expand knowledge on how to convince and shift more people towards a plant-based diet. For this purpose, we focus on the decision-making process of behaviour change by examining a key element of the TTM: the decisional balance (DB).

The DB provides a framework to measure perceived advantages (pros) and disadvantages (cons) of a behaviour change (Foster, Neighbors, & Pai, 2015; Prochaska et al., 1994) and suits well for analysing decision-making across different stages of change. A meta-analysis by Hall and Rossi (2008) showed that the pros and cons change across the stages of change and follow stage-specific principles of progress. The first principle of progress from the pre-contemplation to the contemplation stage is to raise awareness of the pros of the desired behaviour. Behaviour change is initiated once the individual starts contemplating the pros and cons of the desired behaviour. Often, there is a balance between the pros and cons (cognitive ambivalence) at the contemplation stage (Prochaska, 2020, pp. 2268). Thus, the second principle of progress is: reducing the cons of the behaviour change and enhancing a motivation to change towards the desired behaviour. To this end, communication messages on meat reduction should be designed in such a way that the barriers to and cons of meat reduction are perceived as less strong obstacles to behaviour change. Once the individual has decided to change their behaviour, the pros clearly outweigh the cons, and the individual prepares to engage in the desired behaviour. Consequently, to move the individual from preparation to action, the third principle of progress is to consolidate the pros. Positive reinforcement of the perceived pros is important for further progressing to the maintenance stage. In sum, the DB scale can provide insights into a person's belief structure at different stages of change, which is crucial for identifying motivational barriers to behaviour change.

The DB scale has been applied to a broad range of health-related behaviours, such as smoking cessation (Ivey et al., 2019; Velicer, DiClemente, Prochaska, & Brandenburg, 1985), HIV prevention (Prat, Planes, Gras, & Sullman, 2012), weight control (O'Connell & Velicer, 1988), sunscreen use (Aygun & Ergun, 2014), fruit and vegetable intake (Chuan Ling & Horwath, 2001; Ma et al., 2002; Rapley & Coulson, 2005), increased consumption of calcium-rich foods (Shirazi et al., 2006), fat reduction (Rossi et al., 2001) and sugar reduction (Rodda, Booth, Brittain, McKean, & Thornley, 2020). Studying twelve problematic health behaviours, Prochaska et al. (1994) found consistent patterns of two factors, namely pros and cons, across all stages of change. The broad application of the DB scale for many different behaviours indicates that the DB is a sound measuring instrument for analysing behaviour change.

With regards to sustainable diet shifts, the DB scale has not yet been applied to analysing meat-reduction behaviour. This paper aims to fill this research gap by developing, testing and validating a novel DB scale for meat reduction. The DB scale would contribute to a better understanding of behaviour change towards meat reduction through assessing different beliefs about reducing meat consumption.

4. Developing the item inventory of the DB scale (pre-study)

In a pre-study, the initial item inventory of the DB scale for meat reduction was developed. First, a literature search on drivers for and barriers to meat reduction was conducted in August 2021. Databases such as Science Direct, ResearchGate and PubMed were searched with keyword sets. The literature search resulted in 62 potential DB items.

In a second step, two online focus groups with a total of twelve meat eaters (ages 28 to 52) from Germany and Switzerland were conducted to gather additional beliefs and current points of view on meat reduction. A moderator guided the participants through the discussions by asking participants about their perceived pros and cons of their current meat consumption as well as of a (potential) meat reduction. The focus groups generated 13 additional items.

Third, the item inventory was tested for clarity and relevance by four experts from the adjacent fields of consumer behaviour, nutritional behaviour and communication science. An evaluation grid was submitted to each expert to ensure comparability between the expert ratings. The experts were asked to (i) indicate whether each item addressed pros/cons of reducing or maintaining current meat consumption, and (ii) rate each item for its content clarity on a scale from 1 (not at all clear) to 5 (very clear).

Finally, the refined 42-item inventory consisted of 19 statements about potential motivational beliefs about meat reduction and 23 statements about potential hindrances to meat reduction.

In the following, the DB scale's underlying factor structure is statistically explored in Study 1 ($N = 309$) and then tested and validated in Study 2 ($N = 809$). Third, the findings of the newly developed DB scale for meat reduction as well as the research limitations are discussed, and potential areas of application for the DB scale are suggested. Finally, the paper concludes with a short summary of the developed DB scale for meat reduction.

5. DB scale refinement (study 1)

After developing the initial item inventory of the DB scale for meat reduction, an online survey was conducted to explore the underlying factor structure and to discover poorly performing items.

Previous DB studies have usually identified two DB factors (sub-dimensions), namely pros and cons. Due to the previously mentioned multitude of drivers for and barriers to a lower-meat diet, there might be more than two underlying factors of the DB scale for meat reduction. We assume that the DB scale for meat reduction could consist of different factors related to, for example, health, ecological welfare, animal welfare, social acceptance, convenience, or meat enjoyment. A multidimensional DB scale would provide detailed insights into consumers' meat-reduction belief structures at different stages of change.

5.1. Methods and materials

5.1.1. Participants

Data were collected by a commercial panel provider (Respondi, Cologne, Germany) in Germany during January 2022. All participants were meat eaters, aged between 18 and 74 years, and gave written informed consent to participate in the study. Participants were asked to indicate whether they ate meat. Vegetarians and vegans were not recruited. Quotas were used for gender, age, and education. After excluding 24 participants who indicated at the end of the survey that their answers should better not be used for data analysis (no serious participation in the study) and/or completed the survey in less than half of the median duration time (speeder), 309 participants (49.8% female) with an average age of 47.19 years ($SD = 15.51$) were retained for analyses. Table 2 summarises the sample characteristics.

This study was approved by the ethics committee of the University of Zurich (22.6.16).

5.1.2. Measures

DB was measured by 42 items representing different beliefs about a behaviour change towards meat reduction. First, participants answered a filter question: 'Have you reduced your meat consumption in the past?' with response options 'yes' and 'no'. Participants who selected 'yes' were then asked to indicate the importance of each statement for their decision to gradually reduce their meat consumption: 'How important is each of the following statements to you, regarding your decision to reduce your meat consumption?' Participants who selected 'no' were asked: 'How important is each of the following statements to you, regarding your decision to *potentially* reduce your meat consumption?' Participants indicated their response to each item using a 5-point Likert scale ranging from 1 (not at all important) to 5 (extremely important). The perceived pros and cons of a behaviour change can be combined into a DB index (Velicer et al., 1985). The DB index is the result of several specific beliefs regarding a behaviour change towards meat reduction.

To obtain an index of *current meat consumption* per *week* for each participant, the frequency of eating unprocessed and processed meat was multiplied with the indicated meat portion size (Hagmann, Siegrist, & Hartmann, 2019). Higher index scores indicated higher meat intake. The frequency of eating meat was measured by asking participants, 'How often do you eat unprocessed meat (e.g., steak, chicken breast, beef filet)?' and 'How often do you eat processed meat products (e.g., sausages, cold cuts)?' Each question had response options of 'several times a day', 'once a day', '5–6 times a week', '3–4 times a week', '1–2 times a week', 'once every 2 weeks', 'once a week', or 'seldomly'. The portion sizes were measured by asking participants, 'How big or small do you estimate the portion of meat that you typically eat at a meal?' The potential responses for unprocessed meat were '50 g (or less)', '100 g', '150 g', '200 g' or '250 g (or more)', and for processed meat, '1–2 slices of cold cuts/half a sausage (or less)', '3–4 slices of cold cuts/1 sausage', '5–6 slices of cold cuts/1.5 sausages', '7–8 slices of cold cuts/2 sausages' or '9–10 slices of cold cuts/2.5 sausages (or more)'. A short visual scale was used to illustrate the meat portion sizes (Fig. 1). The scale was pre-tested with a sample of 180 students who were asked how easily they could assess their meat consumption using the proposed visual scale. The results showed that the participants perceived estimating their meat intake by means of the visual scale as easy.

Stages of change towards a flexitarian (lower-meat) diet were measured by showing participants a short description of a flexitarian diet: 'According to the German Association of Nutrition, flexitarians are also referred to as "flexible vegetarians" who consciously limit their meat consumption and eat as little, only rarely or only certain qualities of meat as possible' (German Association of Nutrition, 2013). Participants were then asked, 'Would you describe yourself as a flexitarian?', with the following answering options (stages): 'No, and I do not intend to become a flexitarian in the next 6 months' (pre-contemplation), 'No, but I intend to become a flexitarian in the next 6 months' (contemplation), 'No, but I intend to become a flexitarian in the next 30 days' (preparation), 'Yes, I have been a flexitarian for less than 6 months' (action) or 'Yes, I have been a flexitarian for the past 6 months or longer' (maintenance). This measurement was derived from Prochaska and DiClemente's (1993) staging algorithm and was adapted to a flexitarian diet. The distribution of participants varied across the stages of change towards a lower-meat diet. Half of the participants ($n = 157$, 50.8%) were in the pre-contemplation stage, while the other half were distributed across the contemplation stage ($n = 43$, 13.9%), the preparation stage ($n = 10$, 3.2%), the action stage ($n = 28$, 9.1%) and the maintenance stage ($n = 71$, 23%). According to Hielkema and Lund (2021), some neighbouring stages of the TTM are theoretically similar, such as the contemplation and preparation stages, and transitions between the stages of change are fluent. For example, in the contemplation and preparation stages, participants have an intention to perform a desired behaviour but do not behave accordingly. Moreover, the very different group sizes across the five stages of change were not ideal for statistical analyses (e.g., variance of analysis [ANOVA]). Based on these considerations, we did not expect any significant differences in participant belief structures between the five stages of change and decided to summarise the five stages into three main stages as Hielkema and Lund

Table 2
Sample characteristics.

Demographics	Study 1 ($N = 309$)	Study 2 ($N = 809$)
Gender		
Female	154 (49.8%)	391 (48.3%)
Male	152 (49.2%)	417 (51.5%)
Diverse	3 (1.0%)	1 (0.1%)
Age (in years)		
18 – 29	56 (18.1%)	150 (18.5%)
30 – 39	49 (15.9%)	133 (16.4%)
40 – 49	57 (18.4%)	151 (18.7%)
50 – 59	68 (22.0%)	180 (22.2%)
60 – 74	79 (25.6%)	195 (24.1%)
Education level		
Low	98 (31.7%)	219 (27.1%)
Middle	103 (33.3%)	306 (37.8%)
High	108 (35.0%)	284 (35.1%)

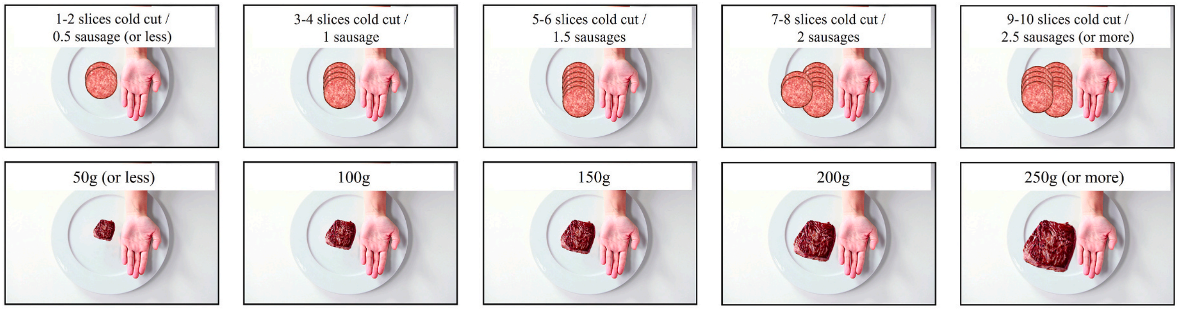

Fig. 1. Measuring meat portion sizes using a visual scale.

(2021) did: (i) consumers not intending to reduce meat consumption (pre-contemplation stage), (ii) consumers with an intention to do so (contemplation and preparation stage) and (iii) current meat reducers (action and maintenance stage). There were 157 participants (50.8%) who did not intend to change their diet towards a low-meat diet, 54 participants (17.5%) who intended to do so and 98 participants (31.7%) who were already practising a low-meat diet.

Participants also reported *sociodemographic information*, such as age, gender, and education (Table 2), as these were needed for sampling quotas.

5.1.3. Statistical analysis

Principal axis factoring with oblique (Promax) rotation was conducted to explore latent factors of the DB scale. Before determining the factors, Bartlett's test of sphericity and the Kaiser–Meyer–Olkin (KMO) measures of sampling adequacy were analysed to ensure that the data met the recommended cut-off values for conducting an exploratory factor analysis (EFA) (Kaiser, 1974; Tabachnick & Fidell, 2007). The final number of extracted factors was determined by a combination of the following criteria: eigenvalue greater than 1 (Kaiser's criterion), sharp inflexion in the graph of the scree plot (elbow criterion), parallel analysis (O'Connor, 2000) and interpretability of the factor solution. According to recommended factor analytic guidelines, such as communalities below .40 and cross-loadings (Ferguson & Cox, 1993; Matsunaga, 2010), poorly performing items were excluded from the analysis. Additionally, one-way ANOVA and post-hoc tests with Bonferroni correction were conducted to examine differences in DB factors between the different aggregated stages of change. Mean values between factors were analysed using repeated-measures ANOVA. For this purpose, negatively formulated factors (i.e., cons) were reverse-coded. Intercorrelations between study variables were investigated by means of Pearson correlations. All statistical analyses were performed using SPSS Statistics software package version 28.0.1.0 (IBM, Armonk, New York). The survey was programmed in SoSci Survey v3.2.30 (Munich, Germany).

5.2. Results

5.2.1. Dimensionality of the DB scale

The statistical criteria for conducting Principal axis factoring were met ($\chi^2(190) = 3056.863$, $p < .001$; $KMO = 0.897$). During the analysis, 22 items were removed due to communalities below 0.40 (14 items) and cross-loadings (8 items). The remaining 20 items resulted in five first-order factors that could be summarised in 2 s-order factors, labelled as pros (motivators for meat reduction) and cons (barriers to meat reduction) (Table 3). The five first-order factors explained 68.7% of the variance in total and were named as follows: (i) perceived benefits of a plant-based diet, (ii) downsides of factory farming, (iii) health barriers, (iv) legitimation barriers and (v) feasibility barriers. Various positive beliefs about following a plant-based diet loaded high on Factor 1 and negative beliefs associated with the production of meat through factory farming loaded on factor 2. Health beliefs related to eating less meat, beliefs that justify eating meat and beliefs about the ease of replacement of meat in the diet as well as necessary effort of following a flexitarian diet loaded on factor 3, factor 4 and factor 5, respectively. All first-order factors indicated good internal consistency ($\alpha \geq 0.70$). Factors 1 and 2 represented the perceived pros of meat reduction ($\alpha = 0.89$), whereas factors 3 to 5 represented the cons ($\alpha = 0.84$).

The DB index was calculated by subtracting the weighted sum of the cons (i.e., (Factor 3 + Factor 4 + Factor 5)/3) from the weighted sum of the pros (i.e., (Factor 1 + Factor 2)/2). Positive index scores indicated more perceived pros of a behaviour change towards meat reduction, while negative index scores indicated more perceived cons. In the present study, the means of the DB index ranged from −0.54 in the no-intention stage ($SD = 1.23$) to 0.77 in the intention stage ($SD = 1.11$) to 1.26 in the performing stage ($SD = 1.34$).

Furthermore, all intercorrelations between the first-order factors were statistically significant and ranged between $r = -0.16$ ($p < .001$) for the correlation between the factors of feasibility barriers and downsides of factory farming to $r = 0.60$ ($p < .001$) for the correlation between the factors of legitimation barriers and health barriers. The pros and cons correlated negatively ($r = -0.38$, $p < .001$).

5.2.2. Differences in DB factors across the stages of change

Results of a one-way ANOVA suggest that there are statistically significant differences between the aggregated stages of change regarding the perceived pros ($F(2, 306) = 52.995$, $p < .001$) and cons ($F(2, 306) = 32.200$, $p < .001$) of behaviour change towards meat reduction. Means, standard deviations and the results of the Bonferroni post-hoc tests are shown in Table 4. Participants who did not intend to change their eating behaviour towards meat reduction perceived the pros of meat reduction as significantly less important ($M = 2.87$) than participants in the intention stage ($M = 3.65$) or in the performing stage ($M = 3.88$). At the same time, participants in the no-intention stage perceived the cons of meat reduction as significantly more important ($M = 3.42$) than participants in the intention stage ($M = 2.88$) or in the performing stage ($M = 2.61$). There was no significant difference between participants in the intention and the performing stage, neither for the perceived pros ($p = .286$) nor for the cons ($p = .139$). Fig. 2 (left side) illustrates mean values of the pros and cons across the stages of change.

The five first-order factors (F1–F5) differed statistically significantly between the aggregated stages of change (F1: $F(2, 306) = 45.823$, p < .001; F2: $F(2, 306) = 34.230$, p < .001; F3: $F(2, 306) = 15.957$, p < .001; F4: $F(2, 306) = 31.500$, p < .001; F5: $F(2, 306) = 16.856$, p < .001). Means, standard deviations and the results of the Bonferroni post-hoc tests are shown in Table 4. The results for F1 and F2 were consistent with the results for the pros subscale across the stages of change. The results for F3 and F5 were also in line with the results for the cons subscale. For F4, post-hoc tests revealed that participants' beliefs in the intention stage ($M = 3.46$) significantly differed from those in the performing stage ($M = 3.06$), which was the only significant difference between the intention and implementation stages across all DB factors. Furthermore, the DB index (pros – cons) differed significantly between all aggregated stages of change (Fig. 3, Table 4).

Table 3
Results of principal axis factoring. Study 1, $N = 309$.

DB factors and corresponding items	Standardized loadings	M (SD)	Eigenvalue	Variance
Pros: Motivators for meat reduction (α = .86)				
Factor 1: Perceived benefits of a plant-based diet (α = .89)		3.04 (1.05)	7.02	35.12
DB1. A plant-based diet offers me a great variety of foods.	.886			
DB2. I often find vegetarian dishes simple and easy to cook.	.817			
DB3. I discover new flavours when I cut down on meat.	.713			
DB4. The availability of meatless dishes and foods is growing and getting more diverse.	.703			
DB5. A plant-based diet helps me to stay physically fit.	.643			
DB6. The production of plant-based foods is less resource intensive than the production of animal-based foods.	.551			
Factor 2: Downsides of factory farming (α = .83)		3.61 (1.02)	3.10	15.49
DB7. Industrial livestock production has significant negative impacts on the environment.	.769			
DB8. Meat from factory farming contains antibiotics that are harmful to people's health.	.722			
DB9. All farm animals raised for meat production experience fear and suffering.	.772			
DB10. Reducing meat consumption means avoiding animal suffering.	.656			
Cons: Barriers to meat reduction (α = .85)				
Factor 3: Health barriers (α = .84)		3.06 (1.03)	1.37	6.83
DB11. Eating meat is necessary to be healthy.	.810			
DB12. Eating meat is essential for building strong muscles.	.718			
DB13. Without meat, the body lacks vital proteins, vitamins, and minerals.	.702			
DB14. Meat dishes are more filling than vegetarian or vegan dishes.	.572			
Factor 4: Legitimation barriers (α = .82)		3.63 (1.06)	1.01	5.04
DB15. Everyone has the right to eat meat.	.860			
DB16. Eating meat is part of my culture.	.742			
DB17. Meat is delicious.	.588			
Factor 5: Feasibility barriers (α = .75)		2.52 (1.12)	1.25	6.25
DB18. I don't know how to replace meat in my diet.	.765			
DB19. I lack the skills to prepare meatless meals.	.695			
DB20. A diet with very little meat would be inconvenient for me because I would have to change my diet a lot.	.613			

DB index: α = 0.71.
Note: M (mean), SD (standard deviation), α (Cronbach's alpha).

In addition to the DB scale, current meat consumption of participants also differed significantly by stage of change ($F(2, 306) = 14.221$, $p < .001$). Post-hoc tests indicated that active meat reducers reported significantly lower meat intake per week ($M = 597$ g/week) than participants who did not intend to reduce meat consumption ($M = 1273$ g/week). There was also a significant difference in meat intake between participants who intended to reduce meat ($M = 797$ g/week) and those who did not ($M = 1273$ g/week). Participants' meat intake in the intention stage did not significantly differ from that in the performing stage ($p = .761$).

5.2.3. Importance of DB factors

Repeated-measures ANOVA revealed significant differences between the importance of the DB factors for meat reduction ($F(4, 305) = 108.035$, $p < .001$). Regarding the pros, participants expressed higher importance of beliefs about the downsides of factory farming ($M = 3.61$) for meat reduction than for the benefits of a plant-based diet ($M = 3.04$) (Table 5). Regarding the cons, beliefs about the feasibility of a low-meat diet ($M = 3.48$) were a significantly stronger barrier to reducing meat consumption than beliefs about health ($M = 2.94$) or legitimation ($M = 2.37$). Fig. 4 illustrates the mean values of the DB factors with the reverse-coded cons.

5.3. Discussion

Study 1 aimed to develop a DB scale for meat reduction. The new DB instrument measures the perceived importance of different beliefs about meat reduction. The statistical analysis revealed a five-factor solution with two higher-order factors. All factors showed good internal consistency in a sample of German meat eaters. Cronbach's alphas of the factors ranged between .75 and .89.

The second-order factors reflect the advantages and disadvantages of changing behaviour, which have been found to be a typical factor structure in previous DB studies (Foster et al., 2015; Prochaska et al., 1994). Furthermore, the results show that the cons outweigh the pros in the no-intention stage, but that this changes once meat eaters intend to change their meat-eating behaviour. As expected, the DB index (pros – cons) differed significantly between the three aggregated stages of change (i.e., no-intention, intention, performing). Our findings are very much in line with the results of a meta-analytic review by Di Noia and Prochaska (2010), who found a comparable pattern of the pros and cons related to dietary behaviour change – but across the five stages of change.

Study 1 revealed five first-order factors of the DB scale (i.e., perceived benefits of a plant-based diet, downsides of factory farming, health barriers, legitimation barriers, feasibility barriers). These factors supported the existence of the pros and cons and allowed detailed insights into the belief structure of meat eaters at different stages of change towards meat reduction. The factor of perceived benefits of a plant-based diet captured positive beliefs about a low-meat diet (e.g., high availability of plant-based foods, new flavours), while the factor of downsides of factory farming included beliefs about the negative effects of industrial livestock production. Both factors cover different

Table 4
Means (M) and standard deviations (SD) for DB factors across the aggregated stages of change.

DB factors and current meat consumption per week	Stages of change (Study 1, $N = 309$)			Stages of change (Study 2, $N = 809$)		
	No intention ($n = 157$)	Intention ($n = 54$)	Performing ($n = 98$)	No intention ($n = 466$)	Intention ($n = 110$)	Performing ($n = 233$)
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Pros (F1 + F2)	2.87 (0.85)^{a}	3.65 (0.71)^{b}	3.88 (0.76)^{b}	3.09 (0.75)^{a}	3.81 (0.55)^{b}	4.00 (0.59)^{c}
F1: Perceived benefits of a plant-based diet	2.56 (0.94)^{a}	3.33 (0.87)^{b}	3.66 (0.92)^{b}	2.75 (0.85)^{a}	3.50 (0.66)^{b}	3.71 (0.77)^{b}
F2: Downsides of factory farming	3.19 (1.03)^{a}	3.97 (0.74)^{b}	4.10 (0.83)^{b}	3.44 (0.90)^{a}	4.12 (0.67)^{b}	4.30 (0.66)^{b}
Cons (F3 + F4 + F5)	3.42 (0.77)^{a}	2.88 (0.86)^{b}	2.61 (0.81)^{b}	3.55 (0.76)^{a}	3.22 (0.57)^{b}	2.70 (0.77)^{c}
F3: Health barriers	3.37 (0.93)^{a}	2.77 (1.09)^{b}	2.72 (1.03)^{b}	3.53 (1.01)^{a}	3.07 (0.90)^{b}	2.69 (1.08)^{c}
F4: Legitimation barriers	4.04 (0.90)^{a}	3.46 (1.01)^{b}	3.06 (1.05)^{c}	4.27 (0.81)^{a}	3.88 (0.79)^{b}	3.40 (0.98)^{c}
F5: Feasibility barriers	2.84 (1.12)^{a}	2.42 (1.11)^{b}	2.05 (0.94)^{b}	2.86 (1.02)^{a}	2.72 (0.85)^{a}	2.01 (0.90)^{b}
DB index (pros – cons)	−0.54 (1.23)^{a}	0.77 (1.11)^{b}	1.26 (1.34)^{c}	−0.46 (1.21)^{a}	0.59 (0.90)^{b}	1.31 (1.14)^{c}
Current meat consumption (g/week)	1278 (1261)^{a}	797 (490)^{b}	597 (806)^{b}	1343 (1330)^{a}	935 (811)^{b}	558 (676)^{c}

Note. Different letters within each row indicate significant ($p < .05$) differences based on the Bonferroni post-hoc test.

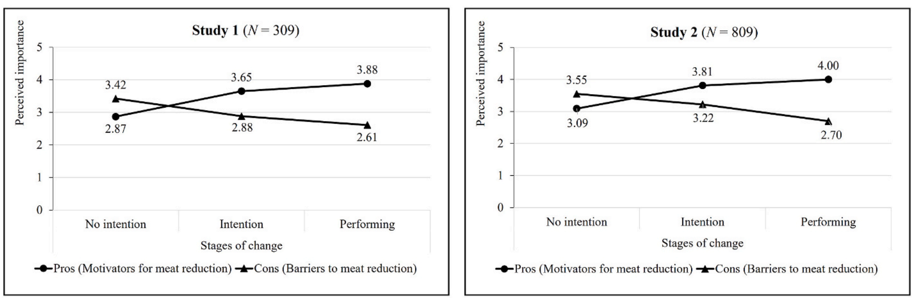

Fig. 2. The perceived importance of the pros and the cons of a behaviour change towards meat reduction by stage of change.

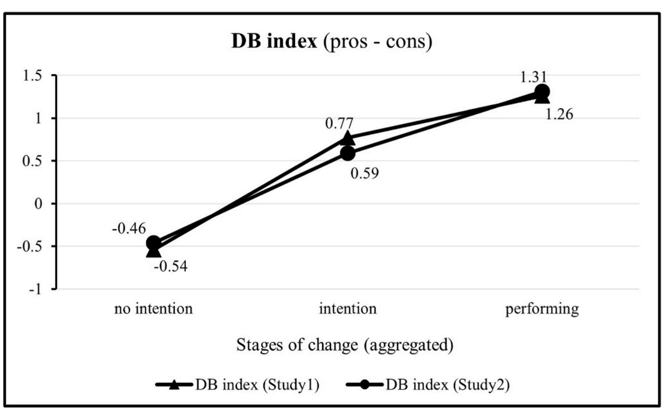

Fig. 3. Mean values of the DB index (pros – cons) across the aggregated stages of change in Study 1 ($N = 309$) and Study 2 ($N = 809$).

Table 5
Results of repeated-measures ANOVA between factors for Study 1 and Study 2.

DB factors	Study 1 ($N = 309$)	Study 2 ($N = 809$)
	M (SD)	M (SD)
F1: Perceived benefits of a plant-based diet	3.04 (1.05)^{a}	3.13 (0.92)^{a}
F2: Downsides of factory farming	3.61 (1.02)^{b}	3.78 (0.90)^{b}
F3: Health barriers	2.94 (1.03)^{a}	2.78 (1.08)^{c}
F4: Legitimation barriers	2.37 (1.06)^{c}	2.04 (0.94)^{d}
F5: Feasibility barriers	3.48 (1.12)^{b}	3.40 (1.03)^{e}

Note. Different letters within each column indicate significant ($p < .05$) differences based on the Bonferroni correction.

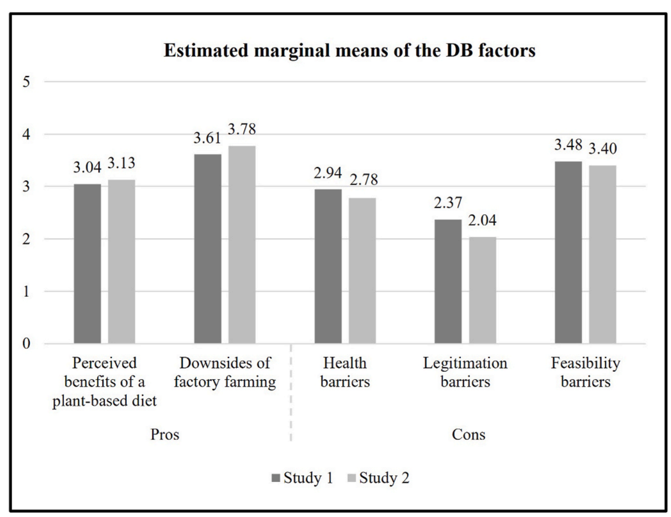

Fig. 4. Importance of DB factors in Study 1 ($N = 309$) and Study 2 ($N = 809$) with reverse-coded cons.

motivational aspects of a lower-meat diet, which are perceived as increasingly important once a person intends to lower their meat intake or is already actively reducing it. The factor of health barriers was based on items that reflect beliefs about critical health-related aspects of a lower-meat diet (e.g., concerns about nutritional deficiencies). Participants in the present study perceived health concerns as a barrier to meat reduction, which is consistent with findings from De Boer et al. (2017), who found that low and medium meat eaters often considered health a reason to stick with meat consumption. The factor of legitimation barriers included beliefs that justify eating meat (e.g., everyone's right to eat meat), which frames meat consumption as a non-active choice (e.g., meat is part of my culture). Lastly, the factor of feasibility barriers assessed beliefs about the practicability of a low-meat diet (e.g., cooking skills to prepare meatless meals). These three factors (health barriers, legitimation barriers, feasibility barriers) represent the perceived cons of meat reduction within the DB scale and might dominate meat eaters' belief structure, especially in the beginning of a behaviour change (no-intention stage). The perceived importance of these barriers decreases as soon as meat eaters intend to reduce their meat consumption. Comparing the DB factors has showed that the downsides of factory farming and feasibility barriers were the beliefs of highest importance for or against meat reduction. The existence of different stages of change towards meat reduction could be also validated by the reported meat consumption in the different stages.

Overall, the results provide support for the applicability of the DB framework to the field of meat reduction. However, the factor structure observed in Study 1 requires confirmation and validation in another sample.

6. DB scale confirmation and validation (study 2)

In Study 2, the developed factor structure of the DB scale for meat reduction was tested with a different sample and then validated with content-related scales.

6.1. Assumptions for validity testing

The validity testing is based on theoretical assumptions and aims to validate the pros and cons of the DB scale for meat reduction. For this purpose, bivariate correlations with existing related constructs were investigated.

Based on the Theory of Planned Behaviour (Ajzen, 1985), positive attitudes towards a behaviour and perceived behavioural control are important predictors of behavioural intention and change. Accordingly, we expected negative correlations between the perceived pros of behaviour change towards meat reduction and negative attitude towards a vegetarian or vegan lifestyle (Michel, Hartmann, & Siegrist, 2021), while assuming positive correlations with the perceived behavioural control scale (Ajzen, 2002). Since meat attachment reflects the positive bond people have with meat consumption (Graça et al., 2015), we further expected negative correlations between the pros and the meat attachment scale. Furthermore, ecological concerns are a strong motivator for meat reduction (Sanchez-Sabate & Sabaté, 2019). Hence, we hypothesised positive correlations between the pros of meat reduction and the ecological welfare scale by Lindeman and Väänänen (2000). Regarding the perceived cons of a behaviour change towards meat reduction, correlations were expected in the opposite direction as assumed for the pros.

It is also possible to work with the DB index as a global indicator for motivation to change towards meat reduction. Although most previous attitudinal studies directly measured attitude towards a behaviour, Ajzen (2002, p. 668) emphasised that 'belief-based measures have the advantage of providing insight into the cognitive foundation underlying perceptions'. Hence, we expected the DB scale to be a statistical predictor for dietary behaviour, in particular meat consumption, over and above already established predictor variables (e.g., global attitude towards meat consumption, gender, age).

6.2. Methods and materials

6.2.1. Participants

Survey data were collected through an independent panel provider (Respondi) in Germany throughout March 2022. The survey was programmed in SoSci Survey v3.2.30 (Munich, Germany). The same sample quotas and exclusion criteria from Study 1 were applied. After excluding 24 participants who indicated at the end of the survey that their answers should better not be used for data analysis (no serious participation in the study) and/or completed the survey in less than half of the median duration time (speeder), 809 participants (48.3% female) with an average age of 47.06 years ($SD = 15.26$) were retained for analyses (Table 2).

Like in Study 1, the stages of change were summarised in three stages based on the level of intent to change. There were 466 participants (57.6%) who did not intend to reduce meat consumption, 110 participants (13.6%) who intended to reduce meat consumption and 233 (28.8%) active meat reducers.

6.2.2. Measures

DB was measured by using the previously developed 20-item DB scale for meat reduction. The mean values of the DB index ranged from −0.46 in the no intention stage ($SD = 1.21$) to 0.59 in the intention stage ($SD = 0.90$) to 1.31 in the performing stage ($SD = 1.14$). *Current meat consumption*, *stages of change* and *socio demographics* were measured as in Study 1. For validity testing, the following constructs were measured.

Participants' *global attitude towards meat consumption* was measured through five items on a semantic differential scale ranging from 1 to 5, with 'Eating meat is … bad – good, unfavourable – favourable, unpleasant – pleasant, against – for, negative – positive' (Lentz, Connelly, Mirosa, & Jowett, 2018). Participants were asked to indicate the statements that most closely aligned with their thoughts towards eating meat. Higher scores indicated a more positive attitude towards meat consumption. Similar to Lentz et al. (2018), the five items were averaged to an attitude index ($\alpha = 0.94$).

Participants' *negative attitude towards vegetarian and vegan lifestyle* was measured with four items developed by Michel et al. (2021). The items included: 'Vegetarianism is just a temporary fashion', 'Vegans are extremists', 'Meat alternatives are only for vegetarians and vegans' and 'Veganism is just a temporary fashion'. Response options ranged from 1 (strongly disagree) to 5 (strongly agree). The internal consistency of the scale was good ($\alpha = 0.83$).

Perceived behavioural control was measured through three items: 'For me to reduce meat consumption would be … ', with five response options from 1 (very difficult) to 5 (very easy), 'If I want to, I will easily be able to reduce my meat consumption', measured on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree), and 'How much control do you think you have over reducing your meat consumption?', with five response options from 1 (no control) to 5 (complete control) (Conner, Sheeran, Norman, & Armitage, 2000). Internal consistency for the scale was acceptable ($\alpha = 0.76$).

The *meat attachment scale* ($\alpha = 0.92$) was developed by Graça et al. (2015) and consists of 16 items. Participants were asked to assess the items on a 5-point scale, ranging from 1 (completely disagree) to 5 (completely agree). Items represented four subscales: (i) hedonism (e.g., 'I'm a big fan of meat') ($\alpha = 0.88$), (ii) affinity (e.g., 'I feel bad when I think of eating meat') ($\alpha = 0.84$), (iii) entitlement (e.g., 'According to our position in the food chain, we have the right to eat meat') ($\alpha = 0.84$) and (iv) dependence (e.g., 'If I couldn't eat meat, I would feel weak') ($\alpha = 0.81$).

Concern for *ecological welfare* was assessed with Lindeman and Väänänen's (2000) ecological welfare scale ($\alpha = 0.92$). The assessment started with, 'It is important to me that the food I eat on a typical day: … ' and was followed by five items: 'Has been produced in a way that animals have not experienced pain', 'Has been produced in a way that animals' rights have been respected', 'Has been prepared in an environmentally friendly way', 'Has been produced in a way which has not shaken the balance of nature' and 'Is packaged in an environmentally friendly way', to which responses ranged from 1 (not at all important) to 4 (very important).

6.2.3. Statistical analysis

A confirmative factor analysis (CFA) was run to statistically confirm the structural model of Study 1. Commonly used fit-indices, such as goodness of fit index (GFI), comparative fit index (CFI), Tucker–Lewis index (TLI), normed fit index (NFI), root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR), were used to assess the model fit. The CFA was conducted in SPSS Amos version 28.0.0 (Amos, Wexford, PA).

Correlational pattern between DB factors and validity variables that were assumed to measure a related construct (i.e., negative attitude towards vegetarian and vegan lifestyle, perceived behavioural control, meat attachment, ecological welfare, global attitude towards meat consumption) was tested through Pearson correlations. Concurrent validity was investigated by means of a hierarchical regression analysis with frequency of meat consumption as dependent variable and gender, age, global attitudes towards meat consumption, and the pros and cons as predictor variables. Average variance extracted (AVE) was used as indicator for discriminant validity. All statistical tests were performed using SPSS Statistics software version 28.0.1.0 (IBM). A significance level of $p < .05$ was applied.

6.3. Results

6.3.1. Confirming the factor structure of the DB scale and AVE

The assumptions for running a CFA were checked and fulfilled. The five-factor model with two higher-order factors revealed a close model fit ($\chi^2(142) = 345.942$, $p < .001$). Fit indices met the recommended cut-off values: GFI = 0.948, CFI = 0.956, TLI = 0.947, NFI = 0.935, RMSEA = 0.048 and SRMR = 0.047. Moreover, the RMSEA was not significant ($p = .178$), which further confirmed that the model fits the data closely (Kenny, 2020). During the analysis, item DB14 was excluded from the model due to a very high modification index (MI = 61.82).

The intercorrelation between the pros and cons was statistically significant ($r = -0.46$, p < .001). Furthermore, internal consistencies were sufficiently high for the pros (α = 0.86), the cons (α = 0.85) and for the five first-order factors (perceived benefits of a plant-based diet (α = 0.83), downsides of factory farming (α = 0.79), health barriers (α = 0.85), legitimation barrier (α = 0.75), feasibility barriers (α = 0.70)). Fig. 5 displays the final model of the DB scale for meat reduction.

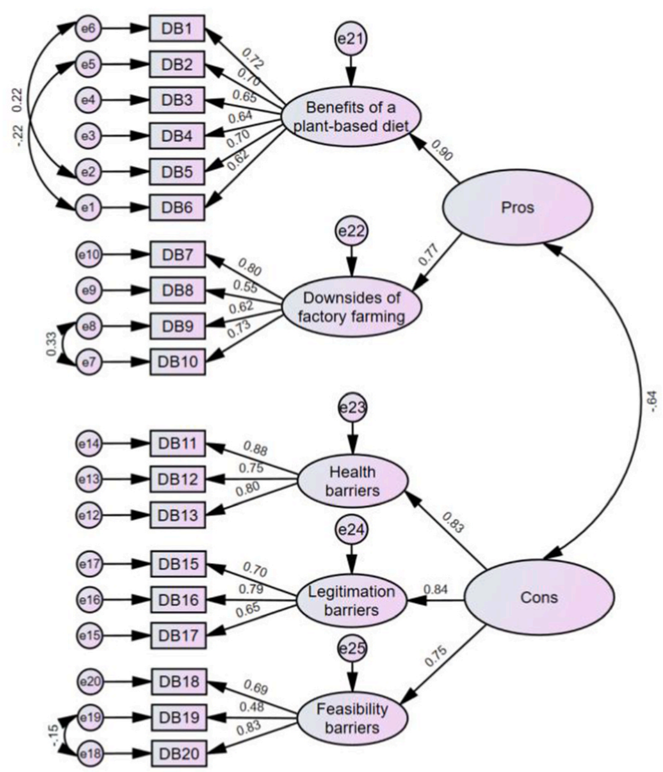

Fig. 5. CFA of the final DB scale for meat reduction, $\chi^2 = 345.942$, $df = 142$, $p < .001$; RMSEA = 0.048. Study 2, $N = 809$. (Coloured figure in print).

Results of the AVE analysis showed that the square root of the AVE for the pros ($AVE = 0.84$) was greater than the correlation with the cons ($r = -0.64$) (Appendix Table A2). According to Fornell and Larcker (1981) AVE ≥0.05 indicates discriminant validity.

6.3.2. Differences in DB factors across the stages of change

ANOVA results indicated that there are significant differences across the stages of change regarding the perceived pros ($F(2, 806) = 155.797$, $p < .001$) and cons ($F(2, 806) = 103.134$, $p < .001$) of behaviour change towards meat reduction. In contrast to the results of Study 1, both perceived pros and cons differed significantly not only between participants in the no-intention stage and in the performing stage, but across all stages of change. Means, standard deviations and the results of the Bonferroni post-hoc tests are shown in Table 4. As in Study 1, the DB index (pros – cons) differed significantly between the aggregated stages of change (Fig. 3).

Furthermore, F1–F5 differed significantly between the aggregated stages of change (F1: $F(2, 806) = 125.093$, p < .001; F2: $F(2, 806) = 99.778$, p < .001; F3: $F(2, 806) = 54.708$, p < .001; F4: $F(2, 806) = 78.890$, p < .001; F5: $F(2, 806) = 62.403$, p < .001). For F1, F2 and F4, similar results as in Study 1 were found across the stages of change. For F3, post-hoc tests indicated significant differences between participants across all stages of change (no-intention stage ($M = 3.53$), intention stage ($M = 3.07$), performing stage ($M = 2.69$)). Furthermore, participants in the intention stage ($M = 2.72$) perceived the feasibility of a lower-meat diet (F5) as significantly more important than those in the performing stage ($M = 2.01$), while there was no significant difference compared to participants in the no-intention stage ($M = 2.86$). Fig. 2 (right side) again illustrates how the perceived importance of the pros of meat reduction increased with the progressive stages of change, while that of the cons decreased.

Current meat consumption of participants differed significantly by stage of change ($F(2, 806) = 39.377$, $p < .001$). Post-hoc tests indicated significant differences across all stages (no-intention stage ($M = 1343$ g/week), intention stage ($M = 935$ g/week), performing stage ($M = 558$ g/week)).

6.3.3. Importance of DB factors

As in Study 1, the results of a repeated-measures ANOVA showed significant differences in mean values between the DB factors ($F(4, 804) = 624.512$, $p < .001$). Again, beliefs about the downsides of factory farming ($M = 3.78$) were perceived as a significantly stronger pro argument for meat reduction than the benefits of a plant-based diet ($M = 3.13$) (Table 5). Furthermore, feasibility barriers ($M = 3.40$) were a significantly stronger barrier to reducing meat consumption than health ($M = 2.78$) or legitimation ($M = 2.04$) barriers. See Fig. 4 for a comparison with the mean values from Study 1.

6.3.4. Correlational pattern with validation variables

All observed correlations between the DB scale and the content-related constructs occurred in the expected positive or negative direction and were significant (Table 6). For example, the pros of the DB scale for meat reduction correlated negatively with the constructs negative attitude towards vegetarian/vegan lifestyle ($r = -0.54$, $p < .001$) and meat attachment ($r = -0.66$, $p < .001$), while correlated positively with the constructs perceived behavioural control ($r = 0.42$, $p < .001$) and ecological welfare concern ($r = 0.50$, $p < .001$). Regarding global indicators, the DB index correlated negatively with global attitude towards meat consumption ($r = -0.64$, $p < .001$) and current meat consumption ($r = -0.40$, $p < .001$). Furthermore, the DB index correlated negatively with other meat-related attitudinal variables that were measured at the same time, such as negative attitude towards a vegetarian/vegan lifestyle ($r = -0.627$, $p < .001$) or meat attachment ($r = -0.822$, $p < .001$).

Table 6
Bivariate (Pearson) correlations between DB factors and other meat-related constructs. Study 2, $N = 809$.

Validity construct	Pros (Motivators for meat reduction)	Cons (Barriers to meat reduction)	DB index (Pros – Cons)
Neg. attitude tow. vegi/vegan lifestyle	−.539***	.531***	−.627***
Perceived behavioural control	.415***	−.509***	.542***
Meat attachment	−.664***	.739***	−.822***
Ecological welfare concern	.499***	−.166***	.386***
Global attitude to meat consumption	.849***	−.859***	−.640***
Current meat consumption	−.336***	.354***	−.404***

Note. ***p < .001, **p < .01, *p < .05.

Table 7
Hierarchical regression with meat consumption frequency as dependent variable. Study 2, $N = 809$.

Model	Step 1		Step 2	
	β	t	β	t
Constant	2.597***	11.878	2.934***	7.281
Age	−.006*	−2.004	−.007*	−2.414
Gender	.338***	3.862	.281***	3.343
Global attitude toward meat consumption	.607***	12.632	.296***	5.067
Pros			−.170**	−2.795
Cons			.467***	7.401

Note. ***p < .001, **p < .01, *p < .05.

6.3.5. Concurrent validity

The results of a two-step hierarchical regression analysis with frequency of meat consumption as the dependent variable are displayed in Table 7. Age, gender and global attitude towards meat consumption were included as predictors in a first step. The model was significant and explained 20% of the variance in meat consumption ($F(3, 805) = 67.271$, $p < .001$). The pros and cons were entered into the model in a second step. The final model was significant ($F(5, 803) = 59.280$, $p < .001$) and the two variables explain an additional variance of 7% ($\Delta R^2 = 0.069$, $p < .001$). The cons significantly predicted higher frequency of meat consumption (ß = 0.47, $p < .001$), while the pros significantly predicted lower frequency of meat consumption (ß = −0.17, $p < .01$). Thus, the pros and cons explained additional variance in meat consumption frequency over and above other important predictors of meat consumption, such as global attitudes towards meat consumption, gender, and age.

6.4. Discussion

The results of Study 2 confirm the factor structure identified in Study 1. All factors (i.e., the pros, the cons and the five first-order factors) show good reliability and good internal consistency, with Cronbach's alphas ranging between 0.70 and 0.86. Furthermore, the results of Study 2 provide support for the validity of the DB scale for meat reduction. The expected correlations between the DB factors and validation variables were sufficiently high, but not too high. This finding confirms the assumption that the new DB scale for meat reduction is related to other attitudinal and behavioural constructs from the field of meat consumption but is also distinct from them. As anticipated, the pros and cons of the DB scale explained additional variance in meat consumption behaviour over and above established predictors of meat consumption (i.e., global attitude towards meat consumption, gender, age). Results similar to those of Study 1 were found for the DB index across the aggregated stages of change and the perceived importance of the DB factors. In sum, the results of the present study suggest that the DB scale for meat reduction is a useful measurement for consumers' beliefs regarding meat reduction that is linked to actual dietary behaviour. In future behaviour change studies, researchers could use both the pros and cons of behaviour change towards meat reduction and the DB index.

7. General discussion

In response to the need for sustainable dietary shifts (Collier et al., 2021; Eker, Reese, & Obersteiner, 2019; Rust et al., 2020), our research advances knowledge on what beliefs are important in consumer decision-making towards more sustainable consumption patterns, such as a low-meat diet. Overall, our findings indicate a five-factor model of decisional balance consisting of two higher-order factors (pros and cons) and five lower-order factors (perceived benefits of a plant-based diet, downsides of factory farming, health barriers, legitimation barriers and feasibility barriers), along with a global DB index. There is substantial evidence for the construct validity and internal consistency of the new DB scale as a measure of consumer beliefs about behaviour change towards meat reduction. This measurement can make theoretical, methodological, and practical contributions to the psychology of meat reduction.

7.1. Theoretical and methodological contributions

Behaviour change theories such as the TTM are not necessarily about figuring out why people engage in a particular behaviour, but rather about analysing and understanding how people progress through different stages of change in order to design and implement interventions to induce desired behaviour change. In this regard, the analysis and elaboration of the decision-making process in reducing meat in the present work offer a helpful advance in theoretical understanding of the shift towards a more sustainable diet. Our analyses revealed five factors within the DB scale: perceived benefits of a plant-based diet, downsides of factory farming, health barriers, legitimation barriers and feasibility barriers. While the first four factors include more attitudinal beliefs, the fifth factor, feasibility barriers, measures more ability-related beliefs. The significant correlation between feasibility barriers and perceived behavioural control underlines the link with capabilities. Nevertheless, all DB factors were interrelated and strongly correlated with the global DB index. Thus, the DB scale seems to comprise an interplay of attitudinal and ability-related beliefs acting together to shape the consumer's belief structure of behaviour change towards meat reduction.

In line with previous behaviour change studies (Flemming et al., 2020; Hsu et al., 2019), the DB scale for meat reduction confirms the stage-specific patterns of the pros and cons across the different stages of change. That is, the cons outweigh the pros in early stages of change (no intention), while the pros outweigh the cons in the later stages of change (intention, performing). In Study 2, we found significant differences between the pros and cons across all aggregated stages of change, whereas in Study 1, the pros and cons differed significantly only between the no-intention and intention stages. The slightly different results of both studies could be due to the lack of power and small sample size of Study 1 ($N = 309$) but also due to differences between the samples. Descriptive analyses showed that the means of the pros and cons in the aggregated stages of change were higher in Study 2 than those in Study 1, and that the average meat consumption in Study 2 (1061 g/week) was also higher than that in Study 1 (978 g/week). Moreover, Study 2 had more participants in the no-intention stage ($n = 466$, 57.6%) than Study 1 ($n = 157$, 50.8%), which might be an indicator for the assumption that the participants in Study 1 were already more sensitised to meat reduction than the participants in Study 2. Further studies are needed to test the DB scale with larger samples.

Regarding methodological contributions, developing and testing new measurements to gauge the shift in consumer behaviour towards reducing meat consumption addresses the need for better assessing consumer readiness to change towards a more plant-based diet. Initial evidence regarding the validity of the DB scale for meat reduction and its flexibility in assessing beliefs (i.e., it can be used as a five-, two- or one-dimensional scale) indicates favourable properties. By assessing specific beliefs and motivation to change using the DB index, the DB scale for meat reduction goes beyond usual, more global attitude measurements and disentangles perceived barriers and limiting beliefs. The DB scale for meat reduction could also be used in segmentation research and might enable identifying consumer segments based on perceived beliefs about readiness to change.

Altogether, our findings suggest that the DB scale for meat reduction is related to attitudes towards meat consumption but that it can also be used as a separate psychological construct to analyse beliefs about meat reduction at different stages of behaviour change.

7.2. *Practical implications*

Our findings may empower practitioners to design, deliver and evaluate tailored interventions motivating consumers to shift towards a more plant-based diet. According to the TTM principles of progress, meat reduction interventions and communication messages should aim to create an imbalance between the pros and cons of behaviour change in favour of the pros of meat reduction (Prochaska, 2020). That is generally, highlighting the pros (perceived benefits of a plant-based diet, downsides of factory farming) and lowering the cons (legitimation barriers, health barriers, feasibility barriers) would be important steps to induce behaviour change towards meat reduction. However, consumers with a higher (positive) DB index score may be more open to information about reducing meat consumption, whereas for consumers with a lower (negative) DB index score, meat reduction messages or campaigns can trigger loss-aversion, motivated reasoning, or reactance to change or activate meat-eating justification strategies (Graça et al., 2015; Rothgerber, 2013). Hence, consumers in the pre-contemplation (no-intention) stage may require different interventions than consumers in the later stages (intention, performing). Of course, this assumption needs experimental testing.

Interestingly, there were greater differences between non-intenders and intenders than between intenders and reducers. This finding illustrates the existing intention–behaviour gap, indicating that beliefs about a flexitarian diet are more widely prescribed than the number of people who are flexitarians in practice. Although participants expressed internalised beliefs about flexitarianism, they had not (yet) reduced their meat intake. Moreover, behaviour change towards meat reduction may also be influenced by other factors, such as habits or norms. Next, we provide more specific recommendations on how practitioners might use our findings on beliefs (DB factors) to encourage consumers to adopt a more plant-based diet.

In both studies, participants expressed the **downsides of factory farming** as particular important beliefs regarding meat reduction compared to the other measured beliefs. Furthermore, our findings showed that factory farming beliefs were best suited to induce behaviour change, i.e., motivating consumers to start thinking about reducing meat consumption. Indeed, Anderson and Barrett found that beliefs about how animals are raised influenced the experience of consuming meat. For example, factory farmed meat tasted more salty, more greasy and less fresh compared to humanely raised meat, and people consumed less meat when they believed it came from a factory farm compared to a humane farm. Interestingly, negative beliefs about factory farms reduced the enjoyment of meat eating, but positive beliefs about humane farms did not increase meat enjoyment (Anderson & Barrett, 2016). According to Anthis (2017), raising awareness of the impact of conventional factory farming on animal welfare, the environment and human health is likely to be a promising approach because so many people occupy the pre-contemplation (no-intention) stage. For example, farmers and animal advocates could collaborate to design awareness-raising campaigns for humane animal farming. Additionally, providing information about the benefits of humane animal farming and meat reduction could motivate non-intenders to start thinking about their own meat consumption, while intenders may be encouraged to consciously buy meat from humane animal farming.

The second-strongest belief in both studies was **feasibility barriers**. Ability-related beliefs were perceived as a significantly stronger barrier to meat reduction than attitudinal-related beliefs (e.g., health or legitimacy beliefs). However, Study 1 and Study 2 revealed mixed findings on feasibility barriers. While in Study 1 beliefs about the feasibility of a low-meat diet differed significantly between non-intenders and intenders, Study 2 revealed a significant difference between intenders and reducers regarding feasibility barriers. These findings indicate that feasibility beliefs can be a strong barrier to both thinking about behaviour change towards a more plant-based diet and convincing intenders to reduce their meat consumption in practice. For example, Lea et al. (2006) suggested that tips on how to make a gradual, easy transition to a plant-based diet could help progress pre-contemplators to later stages. Related to our findings, feasibility beliefs in Study 1 were particularly important in the early stages of change to induce behaviour change; thus, receiving practical tips could encourage non-intenders to consider behaviour change towards meat reduction. Study 2 revealed that feasibility beliefs were also a strong barrier to actual meat reduction for intenders. Indeed, Hielkema and Lund (2021) found empirical evidence that consumers who intend to reduce meat encounter practical barriers that prevent them from doing so. Therefore, we recommend that practitioners provide information on how to implement a low-meat diet in practice at each stage of change. The different results could be due to the different sample sizes and slightly different sample characteristics, e.g., in terms of reported meat consumption (as mentioned earlier). Further recommendations refer to using role models in communication because they could help inspire consumers to start thinking about changing their behaviour (i.e., progress from the no-intention to the intention stage). Regarding transitions to later stages of change (i.e., progress from the intention to the performing stage), knowledge about vegetarian dishes that are easy and quick to prepare, or recipes with ingredients that can replace meat in a meal, could help move consumers to the action stage.

Our research results showed that awareness of the **benefits of a plant-based diet** was an important enabler for considering behaviour change. Consumers who see more benefits of eating less meat were more likely to change their behaviour than those who did not see any benefits. Therefore, educating consumers on the benefits of a flexitarian diet might be an important step towards meat reduction. For example, communication campaigns could inform consumers about what responsible meat consumption means and how much meat is recommended according to official dietary guidelines. Furthermore, exposing consumers to new dishes and showing them a variety of plant-based and vegetarian dishes in out-of-home settings (e.g., in restaurants and canteens) may increase familiarity with and liking of meat-free dishes and create positive associations (e.g., tastiness) with a flexitarian diet.

Research on flexitarianism has shown that **health** aspects can be a major enabler for meat reduction, but consumers also express health-related concerns about a diet with little or no meat (Collier et al., 2022). Among our participants, health was perceived as a barrier to meat reduction. In both studies, non-intenders and intenders significantly differed regarding perceived health barriers to meat reduction, while Study 2 also revealed a significant difference in health barriers between intenders and reducers. Thus, we recommend, for example, providing information on how to get the necessary vitamins and proteins with a flexitarian diet and on how much (or less) meat is needed for a healthy diet based on dietary guidelines.

Legitimation beliefs were the weakest barriers to reducing meat consumption. We assume that participants take eating meat for granted and perceive it as not changeable, so that legitimation barriers are less important in the decisional balance towards meat reduction. Consumers might have the misbelief that they have to give up all meat when following a more plant-based diet. Thus, we advise practitioners to point out in their communication about flexitarian diets that the goal is to reduce meat intake, not give it up.

Overall, changing consumer eating behaviour will need time because meat consumption is embedded in a complex cultural, economic and political system (Rust et al., 2020). Our results indicate that beliefs play an important role in decision-making and that consumers are increasingly contemplating meat reduction, but there are also other factors influencing behaviour change towards meat reduction. For example, the popularity of ethnic cuisines or plant-based meat alternatives may also influence how consumers change their meat consumption.

7.3. Limitations and future research

Some limitations need to be addressed. First, reducing meat consumption can be a sensitive topic for meat eaters. Thus, participants' answers might have been influenced by reactance, or they might have given answers that were deemed socially desirable. We tried to counteract reactance by formulating the questions as neutrally as possible. Furthermore, we tried to explain to the participants, where possible and without prejudging, why we were interested in their personal opinion on meat reduction. Second, both studies were conducted in Germany, but we expect similar results in other countries, especially in those with a comparable culture, for example the Netherlands. In countries with a very different culture and excessive meat consumption, such as the USA, Australia or Argentina, the DB scale might be different. Future research could investigate the DB scale for meat reduction in samples from other countries. Third, this research was cross-sectional, but differences and changes likely exist within individuals over their lifetime, as their diets and dietary beliefs may change (Klöckner, 2013; Lea et al., 2006). The DB scale could be used to measure such changes in consumers' belief structure and to document the time consumers need to progress through the stages of change.

A further limitation refers to the measurement of the stages of change towards meat reduction. That is, measuring the contemplation stage through the statement 'No, but I intend to become a flexitarian in the next 6 months' could indicate that a person has already made the decision to reduce meat consumption. Thus, the contemplation stage could overlap with the preparation stage, which was measured through 'No, but I intend to become a flexitarian in the next 30 days'. Consequently, the measurement of these stages is not sufficiently distinctive. For further studies, we suggest adapting the operationalisation of the contemplation stage as follows: 'No, but I *am thinking about* becoming a flexitarian within the next 6 months'.

Future research could examine the application of the DB framework to other meat and nutrition-related topics, for example, plant-based meat alternatives. Since the potentials of these products (e.g., in terms of environment and animal welfare) and the risks (e.g., in terms of health aspects) are currently being critically discussed in science and society, it would be interesting to investigate the different beliefs about the pros and cons of these products by means of a DB scale for plant-based meat alternatives. Researchers could follow the methodological approach outlined in this paper.

8. Conclusion

The purpose of this paper was to develop, test and validate a new DB scale for meat reduction. Previously, it was unclear (i) whether the DB framework could be applied to the area of meat reduction and (ii) whether there can be multiple factors underlying the DB scale. By using the newly developed and psychometrically verified DB scale for meat reduction, we provided empirical evidence for the applicability of the DB scale to meat reduction and the existence of two higher-order factors as well as five lower-order factors. Investigations across the stages of change showed that highlighting the perceived pros of meat reduction (i.e., benefits of a plant-based diet, downsides of factory farming) and lowering the perceived cons (i.e., health barriers, legitimation barriers, feasibility barriers) might be promising interventions to encourage meat eaters to start thinking about a behaviour change in terms of meat reduction. Specifically, our results showed that addressing beliefs about the downsides of factory farming and beliefs about the feasibility of a low-meat diet were the strongest arguments for and against behaviour change towards meat reduction. Ultimately, we hope that the results of this paper will help researchers reliably measure individuals' belief structure of reducing meat consumption at different stages of change as well as help practitioners develop persuasive messages for meat reduction.

Author contributions

AMS and CH designed the studies and developed the questionnaire. AMS collected the data, conducted data analyses, and wrote the manuscript. CH was involved in all steps and gave feedback. All authors have approved the manuscript in its present form.

Declaration of interests

The authors declare that they have no competing interests.

Ethic statement

Research involving human participants have been performed in accordance with the Declaration of Helsinki. The research of the submitted article was approved by the Ethics Committee of the University of Zurich (16-6-2022).

Funding

The data collection was supported by the University of Zurich.

Ethics approval and consent to participate

The study was approved by the Ethics Committee of the University of Zurich (16-6-2022).

Research data for this article

Data will be made available on request.

Data availability

Data will be made available on request.

Acknowledgement

We would like to thank Prof. Werner Wirth and Dr. Pia Furchheim for proofreading the article and providing critical feedback. We are also very thankful to the reviewers who provided important feedback to improve the paper.

Appendix

Table A1
Documentation of model adaptations. Study 2, $N = 809$.

Model	Modification	PCMIN/DF	GFI	CFI	TLI	NFI	RMSEA	SRMR	χ^2	DF
0		4.161	.917	.922	.909	.900	.063	.055	571.829	164
1	- DB14	3.817	.928	.933	.921	.912	.059	.053	468.977	146
2	DB19~~DB20	3.807	.936	.942	.932	.921	.055	.049	418.783	145
3	DB19~~DB20	3.540	.941	.949	.940	.928	.052	.048	384.325	144
4	DB19~~DB20	3.419	.944	.952	.943	.931	.050	.047	367.283	143
5	DB19~~DB20	3.265	.948	.956	.947	.935	.048	.047	345.942	142

Note. χ^2 values are with Yuan-Bentler correction.

Table A2
Results of the average variance extracted (AVE) analysis. Study 2, $N = 809$.

DB Subscale	Pros	Cons
Pros	**.836**[a]	
Cons	−.643	**.812**[a]

Note. [a] Square root of AVE.

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