Steak or fake? Analysing the factors influencing purchase intention of plant-based meat alternatives

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Communication Science

July 22, 2022

1. Abstract

Society has become increasingly aware of the environmentally, animal welfare, and health issues of meat products. As a result, many people switch to meat-avoiding or -reducing diets, which has increased the growth of the meat alternative as many people regard meat substitutes as a viable alternative. To gain insights into the factors that are influencing the intention to purchase plant-based meat alternatives (PBMA)– one of the most popular alternatives – this study uses Ajzen's widely applied Theory of Planned Behavior (TPB) as a guiding framework. Moreover, based on the recommendation of previous studies, the model is expanded with seven other factors: Moral obligation, self-identity, anticipated emotional outcome, animal welfare, environmental and health concern, and food neophobia. After deploying a questionnaire amongst young German-speaking adults (age 18-25), the results are analyzed through hierarchical multiple regression analysis. The results reveal that all four models contributed to improving the variance explained in purchase intention. Moreover, attitude, animal welfare concern, and food neophobia significantly predict PBMA products purchase intention. Contrary to prior literature, the other TPB predictors social norm and perceived behavioral control, as well as the other expanded factors, did not yield statistically significant results. Several limitations and directions for future research and practice are discussed.

Keywords: Meat alternatives, purchase intention, ethical consumerism

2. Introduction

Vegan burger, vegan schnitzel, vegan sausage, or vegan chicken, the meat alternatives market is becoming increasingly popular and profitable (Wunder, 2021). Next to new meat alternatives brands like Beyond Meat or Vivera, established fast-food chains like McDonalds and meat producers like Tönnies are now also offering these new products to their costumers (Tönnies, 2021). In search of the best product, companies have developed different kinds of meat alternatives, the most common ones being lab-grown cultured meat, insect-, algae-, and plant-based meat alternatives. Amongst those, the plant-based version seems to be the most popular, followed by cultured meat and insect- or algae-based meat alternatives (Gómez-Luciano, 2019; Onwezen et al., 2021). Thus, Onwezen et al. (2021) advised to focus on plant-based meat alternatives (PBMAs) as these currently hold the most potential.

This potential for growth can help to close the market gap from meat substitutes to traditional meat. In the meat-loving country Germany, for instance, the production volume of plant-based meat alternatives increased by about 30,000 tons from 2019 to 2021 (Statista, 2022b). Additionally, in a survey by the German Environment Agency 15% of respondents have indicated that PBMAs are a good substitute for traditional meat and 26% would be willing to try it (Statista, 2021). Moreover, as the primary consumers of meat alternatives in Germany are young adults from generation Y (millennials) and Z, the future potential of the market becomes even more evident (Alae-Carew et al., 2022; Statista, 2022a).

This prompts the questions how PBMAs have become so popular and what influences their purchase intention. In several studies, consumers consistently listed health, animal welfare, and environmental concerns as the main drivers for reducing their meat intake or even switching to plant-based diets (Lentz et al., 2018; Pakseresht et al., 2022). The health concerns are mainly based on the findings that high consumption of red and processed meat is associated with an increased risk of colorectal cancer (Givens, 2018; Domingo & Nadal,

2017). As for the environmental concerns, the livestock industry not only accounts for 14.5 – 18% of all of humanities greenhouse gas emissions (Gerber et al., 2013), it is also responsible for causing water pollution (UNESCO, 2017), and contributing to deforestation of tropical rainforests for soy plantations as animal feed (FAO, 2016). These environmental concerns, but also issues related to animal welfare were made increasingly aware of by social movements such as Fridays for Future that mobilized many young adults (Marquardt, 2020; Wallis & Loy, 2021).

Based on that, it makes sense that young adults are the main consumers of PBMAs as their values might have shifted with their increased environmental engagement. Such relationships between personal values and purchase behavior of ethical goods have been studied frequently and are related to the concept of ethical consumerism. This concept can be defined as "the purchase and consumption of goods and services in accordance with one's social or moral beliefs. For example, an environmentally conscious consumer will prefer green brands and is often willing to pay a premium for them" (American Psychological Association, n.d.). Hence, the purchase of PBMAs clearly relates to ethical consumption behavior as consumers' buying decision is often ethically or environmentally driven (Lentz et al., 2018).

Next to these personal values, more product-related factors might also be important in determining the purchase intention of PBMAs. For this, many studies in the ethical consumption context have used Ajzen's (1991) Theory of Planned Behavior (TPB). Next to its original predictors, attitude towards the behavior, subjective norm, and perceived behavioral control, the theory is often extended with the factors proposed by Conner & Armitage (1998). These include moral obligation/norms, self-identity, and/or affective beliefs (Conner & Armitage, 1998). Through several studies, it was shown that the expanded model better predicts purchase intention as it accounts for a different morality and the inclusion of an

emotional component in the model (Beldad & Hegner, 2018; Dowd & Burke, 2013; Onwezen et al., 2022; Conner & Armitage, 1998).

Besides that, the concept of food neophobia has received increasing attention over the past decades. For meat alternatives, the concept has shown to negatively affect their adoption (Hoek et al., 2011) and purchase intention (de Koning et al., 2020). Lastly, animal welfare, environmental, and health concern have also been studied in relation to organic food or meat alternatives as consumers' have mentioned them amongst the main reasons for changing their diet (Siegrist & Hartmann, 2019; Marcus et al., 2022).

Hence, the study aims at addressing the research question: *What are the factors that influence young German-speaking adults' intention to purchase PBMA products?* While there are already many studies that investigate ethical food consumption with the TPB, this study offers a novelty perspective as it integrates more factors than previous studies. For instance, in a similar study about meat alternatives in Germany, Marcus et al. (2022) have connected the TPB to health, animal welfare, and environmental concern. The study, however, disregarded the commonly included factors moral obligation, self-identity, and affective beliefs in the expanded TPB. Additionally, studies using the TPB have, to the best of the author's knowledge, not yet integrated the concept of food neophobia amongst the other TPB factors.

3. Theoretical Framework

3.1 Purchasing PBMAs from the Perspective of the Expanded Theory of Planned Behavior

The theory that was used as a basis for this study, the TPB, assumes that performing a certain behavior becomes more likely if the intention to do so has been formed beforehand (Ajzen, 1991). In its original form, the model consists of three factors predicting actual behavior through behavioral intention: Attitude towards the behavior, subjective norm, and

perceived behavioral control. The TPB's adequacy has been proven several times as meta-analyses have shown that it can explain 27-36% of the variance in behavior and up to 45% of the variance in behavioral intention (McEachan et al., 2011; Armitage & Conner, 2001).

The first predictor, attitude towards the behavior, "is assumed to be a function of readily accessible beliefs regarding the behavior's likely consequences" (Ajzen, 2020, p. 315). Thus, it is about people's belief whether the behavior will lead to a positive or negative outcome. In several studies, it has already been proven that attitude indeed predicts behavioral intention, most of the time being its strongest predictor (Armitage & Conner, 2001; McEachan et al., 2011; Nardi et al., 2019; McDermott et al., 2015). The reason for this is that positive attitudes towards a behavior mean that people expect favorable consequences from that behavior, which is preferred over those actions linked to unfavorable consequences or negative attitudes (Ajzen, 1991). In similar studies about, for instance, animal-welfare friendly products (Beldad & Hegner, 2020), sustainably-sourced food (Dowd & Burke, 2013), and meat alternatives (Marcus et al., 2022) it has also been confirmed that positive attitudes towards such products increases the intention to perform that act.

Hypothesis 1. *Participant's positive attitude towards purchasing PBMA products increases their intention to purchase such products.*

The second predictor, subjective norm, "refers to the perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991, p. 188). This component is generally found to be the weakest predictor of intention (Armitage & Conner, 2001; McEachan et al., 2011). In their meta-analytic review of the TPB's efficacy, Armitage and Conner (2001) noted that this is likely due to the concept's measurement as many studies did not include enough items. McEachan et al. (2011) suggested that this is rather due to differences in behavior type as subjective norm predicted intention better for safer sex practice than, for instance, physical activity and abstinence behaviors. Regarding PBMAs, their increasing popularity might make

it more likely that consumers base their purchase decision on the behavior or beliefs of others. Therefore, in similar studies about meat alternatives, subjective norm has been included as an important predictor for purchase intention and significantly predicted purchase intention (Marcus et al., 2022).

However, in his study about norms for environmentally responsible behavior Thøgersen (2006) criticized the factor subjective norm study and suggested that the "subjective norm measure sometimes captures a descriptive norm rather than social pressure" (Thøgersen, 2006, p. 258). Instead, social norm might be better suited to capture social pressure. The concept social norm consists of two normative beliefs, an injunctive and a descriptive one. The former describes whether important individuals or groups approve of a certain behavior while the latter is about which behavior important others usually perform (Cialdini & Goldstein, 2004).

As a response, Beldad and Hegner (2020) replaced subjective norms with social norms that serves as an overarching construct for subjective social norms including descriptive and injunctive norms. Based on the ideas of Thøgersen (2006), Cialdini and Goldstein (2004), and Beldad and Hegner (2020), this study also uses the construct 'social norm' rather than the TPB's subjective norm. The construct is operationalized based on the study of Beldad and Hegner (2020): "[C]onsumers' awareness of what individuals within their immediate environment do" (p. 465). Therefore, the second hypothesis is:

Hypothesis 2. *The social norm of consuming PBMA products positively influences participants' intention to purchase said products.*

The third predictor of the TPB, perceived behavioral control (PBC), refers to "the perceived difficulty of performing the behavior in question" (Ajzen, 1991, p. 196). Furthermore, in the case of ethical consumption, PBC is often separated into two distinct parts, namely financial ability and availability of the product in question. As PBC is assumed

to change per behavior and population (Ajzen & Fishbein, 1980), the importance of both parts also varies over time and product. Based on the higher costs of PBMA products, compared to their meat counterparts, financial ability is quite relevant as studies indicated that increased costs are a significant barrier for adopting a vegetarian diet (Povey et al., 2001) Furthermore, Mancini and Antonionli (2020) have also noted that consumers are less willing to pay a premium price for meat alternatives.

Regarding availability of PBMA products in supermarkets etc., studies have shown that it is generally relevant to consumers when making purchase decisions as it satisfies consumers' need for convenience (Corrin & Papadopoulos, 2017). However, the market for PBMA products is growing, reducing availability-problems in western countries (Zhao et al., 2022). Thus, the factor might not be as relevant anymore, as prior studies indicated (Beldad & Hegner, 2020; Marcus et al., 2022). However, these availability problems might only be resolved in bigger cities where a wide variety of shops can be found. In smaller cities or villages, such availability problems might very well still exist. From this, the following set of hypotheses emerges:

Hypothesis 3a. *Perceived behavioral control, in terms of participants' financial capability to pay a higher price for PBMA products, positively influences participants' intention to purchase said products.*

Hypothesis 3b. *Perceived behavioral control, in terms of the perceived availability of PBMA products, positively influences participants' intention to purchase said products.*

Next to the original predictors, Ajzen (1991) also explains that the TPB is open to other predictors. Thus, for topics with a stronger ethical component, the theory is often extended with the factor moral obligation (Beldad & Hegner, 2018; Beldad & Hegner, 2020; Beck & Ajzen, 1991). Ajzen (1991) characterizes moral obligation as a "personal feeling of moral obligation or responsibility to perform, or refuse to perform, a certain behavior"

(p.199). Including this factor might improve the model as the TPB's social pressure component does not account for such personal feelings (Ajzen, 1991; Conner & Armitage, 1998; Dowd & Burke, 2013). In the case of PBMA products, consumers have frequently indicated that ethical concerns are the biggest reason to switch to a vegetarian diet or reduce their meat consumption (Fox & Ward, 2008; Estell et al., 2021). Thus, including moral obligation as a predictor is highly relevant, as previous studies have shown (Beldad & Hegner, 2020; Dowd & Burke, 2013). Hence, the next hypothesis:

Hypothesis 4. *Feelings of moral obligation to purchase PBMA products positively influence participants' intention to purchase said products.*

Next to moral obligation, self-identity has also shown to increase the TPB's predictive power, specifically in studies related to ethically or sustainably sourced food (Dowd & Burke, 2013; Beldad & Hegner, 2018; Shaw & Shiu, 2002). Conner and Armitage (1998) define the concept "as the salient part of an actor's self which relates to a particular behavior" (p.1444). Additionally, they note that for certain behaviors, self-identity can indeed be a vital antecedent of intentions. In their article, they argue that it describes individuals' view of themselves in society and the extent to which they identify with certain kinds of societal roles, such as being an activist or ethical consumer (Conner & Armitage, 1998). When adopting vegan diets, ethical animal welfare has consistently been named as one of the most important factors (Janssen et al., 2016). Thus, it can be argued that identifying oneself as an ethical consumer can be an important predictor for purchase intention of PBMA products. Taken together with the previous points, the hypotheses is stated as follows:

Hypothesis 5. *The assumption of an identity (self-identity) as an ethical consumer positively influences participants' intention to purchase PBMA products.*

Next to these rather rational antecedents for PBMA products purchase intention, Conner & Armitage (1998) note that "anticipated affective reactions to the performance or

nonperformance of a behavior may be important determinants of attitudes and intentions" (p.1446), especially in situations where the behavioral outcomes are connected to negative emotions. These affective reactions refer to the connection of emotions such as regret or pride with behaviors like intention to consume alternative proteins (Onwezen et al., 2022). Furthermore, Arvola et al. (2008) investigated the influence of positive affective attitudes, related to moral self-reward, on purchase intention of organic foods and found a significant positive relationship.

Hypothesis 6. *High scores of anticipated emotional outcome, referring to anticipating positive emotions, positively affect participants' intention to purchase PBMA products.*

3.2 The Role of Animal Welfare, Environmental, and Health-Related Concerns in Purchasing PBMA Products

Next to the TPB, it is also important to investigate the influence of the most frequently mentioned reasons/concerns for adopting plant-based diets: Animal welfare, environmental, and health concerns (Janssen et al., 2016; Hopwood et al., 2020).

Animal welfare concern is consistently one of the key drivers for the consumption of PBMA products (Janssen et al., 2016; Bryant et al., 2020). In a study by Hoek et al. (2011) both non-users and users indicated that ethical aspects, including animal welfare, were positively associated with meat substitutes consumption. However, only heavy users and vegetarians find these aspects to be relevant in their food choice (Hoek et al., 2011). Contrary to these findings, Götze and Brunner (2021) found a cluster with participants that are concerned about animal welfare and take these issues into consideration when making food choices, which is also in line with the findings of Janssen et al. (2016). As studies in Germany have also shown that this is an important predictor for purchase intention of meat alternatives (Bryant et al., 2020), this hypothesis emerges:

Hypothesis 7. *High levels of animal welfare concern positively affect participants' intention to purchase PBMA products.*

Another important factor for consuming PBMA products is environmental concern (Hopwood et al., 2020). In their study about consumers' attitudes towards environmental concerns of meat consumption, Sanchez-Sabate and Sabaté (2019) found out that most people are still not reducing their meat consumption and are relatively unaware of the industry's environmental impact. Nevertheless, environmental concerns already positively influence consumers to avoid or reduce meat products in their diet (Sanchez-Sabate & Sabaté, 2019). Furthermore, Hoek et al. (2011) pointed out that higher interests in ecological welfare positively affected participants to become heavy users of meat substitutes, stressing the importance of environmental factors. Adding on to this, Ploll et al. (2020) indicated that vegans or vegetarians that recently (from 2013-2016) adopted these diets mentioned environmental motives as the main reasons for switching their diets. Based on this knowledge, the next hypothesis can be derived:

Hypothesis 8. *High levels of environmental concern positively affect participants' intention to purchase PBMA products.*

Regarding health concern (or attitude/consciousness in other studies), studies into food choice have found out that health interest predicts purchase intention of, for instance, organic food (Michaelidou & Hassan, 2008). Adding on to this, Marcus et al. (2022) recently demonstrated a direct influence of health concern on intention to purchase meat alternatives. In their meta-analysis, Corrin and Papadopoulos (2017) noted that while many people acknowledge the health benefits of vegetarian diets, others still question its healthiness and whether these benefits are truly related to such diets. Generally, there seems to be at least some ambivalence about the influence of health concern on purchase intention of PBMA and similar food products as Greene-Finestone et al. (2008), for instance, found a higher score of

health interest amongst omnivores. Nevertheless, as most studies rather find a positive relationship between health concern and purchase intention, the hypothesis is stated as follows:

Hypothesis 9. *High levels of health concern positively affect participants' intention to purchase PBMA products.*

3.3 Food neophobia

Food neophobia is a concept that was originally developed to investigate eating disorders but has since been used to also investigate consumer behavior as new type of products, like meat alternatives, have been developed. Pliner and Hobden (1992), who also developed the Food Neophobia Scale (FNS), defined the concept "as a reluctance to eat and/or avoidance of novel foods" (p.105). Influences on food neophobia include types of meat alternatives (Onwezen et al., 2021) and familiarity (Mancini & Antonioli, 2020; Hoek et al., 2011; Bryant et al., 2019). Studies about differences in food neophobia between, for instance, plant-based and animal-/insect-based meat alternatives have shown that the former alternatives are generally more accepted and less influenced by food neophobia than the latter ones (Onwezen et al., 2021).

One of the reasons for that is familiarity with these kinds of novel foods (Onwezen et al., 2021; Hoek et al., 2011). Familiarity generally seems to influence food neophobia significantly, as Hoek et al. (2011) pointed out that non-users generally reported higher food neophobia for meat substitutes than light/medium-users. An interesting finding, however, is that heavy-users of meat substitutes only reported lower food neophobia scores than non-users when excluding vegetarians. The authors explained this finding by theorizing that vegetarians might be generally more concerned when trying unknown food (Hoek et al., 2011).

In their study, Faria and Kang (2022) investigated antecedents of food neophobia towards plant-based meat which in turn predicted willingness to try these products. They observed that neophobia towards PBMA products negatively predicted consumers' willingness to try, thus, proving the importance of food neophobia when predicting intention or willingness to try (Faria & Kang, 2022). Adding on to that, Dupont et al. (2022) observed non-significant values of food neophobia on willingness to consume cultured meat burgers. Instead, they found a slight negative influence on attitudes towards cultured meat. Generally, findings for food neophobia of PBMAs seems to be rather inconclusive as studies have both found significant and non-significant values (e.g. Hwang et al., 2020; de Koning et al., 2020). Hence it is important to further investigate the influence of food neophobia on PBMA products, resulting in the following hypothesis:

Hypothesis 10. *High levels of food neophobia towards PBMA products negatively affect participants' intention to purchase said products.*

4. Method section

4.1 Data collection and sample properties

To test the 11 research hypotheses, data was collected through an online questionnaire. Participants were reached using a snowball sampling approach, mostly through Instagram stories, WhatsApp, and a Sona Systems® pool available to students of the studies psychology and communication science at the University of Twente. After around four weeks of data collection 180 responses were collected of which 29 responses were incomplete. Moreover, participants older than 25 (six respondents) were not included in the analysis and three outliers were deleted. Additionally, after inspecting the sample, it became clear that the group of meat eaters (flexitarians and omnivores) was almost three times as big as the meat avoider group (vegans and vegetarians) (see Appendix D). Thus, it was decided that meat avoiders responses will only be used for the descriptive results and not for the hierarchical regression

analysis, leading to a final respondent number of 104. This sample size meets Harris' (1975) proposed rule of thumb of $N - m > 50$ (m is the number of IVs) and the general rule of thumb of 10 cases per predictor (Wilson VanVoorhis & Morgan, 2007).

4.2 Measurements

Most of the survey items used to measure the research constructs were obtained from previously validated scales. The items measuring the TPB's factors were based on similar studies using the theory in the ethical consumption context. All items, except for attitude, were measured on 7-point-likert scales ranging from strongly disagree to strongly agree (see Appendix B for an overview of all items). The three items each for *purchase intention*, *availability*, *financial capability*, *social norms*, and *moral obligation* were based on Beldad and Hegner's (2020) study about animal-welfare friendly products purchase intention.

Items for the a*ttitude* construct were based on Marcus et al's (2022) study about meat alternatives. The scale consisted of the same statement ("For me to eat plant-based meat alternatives on a regular basis in the future would be…") with different types of answer scales, ranging from, e.g., extremely bad to extremely good, and extremely unpleasant to extremely pleasant.

Self-identity was based on an earlier study from Beldad and Hegner (2018) about fair trade products purchase intention. The three original items were expanded by one item, "I consider myself as an environmentally conscious consumer", to account for the environmental component of PBMAs.

Moreover, the anticipated emotional outcome scale was based on Onwezen et al. (2013) ("If I were to buy plant-based meat alternatives products, then I would feel proud/worthy/exceptionally good."; "If I were to buy plant-based meat alternatives products,

then I would feel guilty/feel remorseful/have a bad conscience.") and Shaw et al. (2000) ("My purchasing a plant-based meat alternative product will result in my peace of mind.").

Health concern was based on Hopwood et al.'s (2020) motives for vegetarian eating from which only the four health-related items were used: "I care about my body", "I want to be healthy", etc. Animal welfare concern was also based on Marcus et al.'s (2022) study and included five items (e.g., "Livestock farming raises serious ethical questions about the treatment of animals in Germany."). The four items for the environmental concern construct were taken from Diekmann & Preisendörfer (2003): "If we continue our current style of living, we are approaching an environmental catastrophe." Lastly, the food neophobia scale was taken from Faria & Kang's (2022) study and included five items (e.g., "I don't trust new foods like plant-based meat.").

4.3 Survey design

Before designing the actual questionnaire, all items were translated from their English literature basis into the German language by a bilingual speaker (native in German, fluent in English). As a next step, the questionnaire was pre-tested to eliminate possible grammar mistakes or misunderstandings. The general outline of the online questionnaire was divided into several parts. Firstly, participants were welcomed to the study and informed about the study's purpose and data usage to create a somewhat trusting environment. Following that part, participants were presented with statements regarding their animal-welfare, environmental, and health concerns, similarly to the outline of Marcus et al. (2022). Afterwards, respondents were reminded of the study's purpose and first introduced to PBMA products by being provided with a definition: "In this study, plant-based meat alternatives are food products that resemble traditional meat products in name, form or consistency" (see Appendix A for full, translated description in German). Moreover, some examples were given and it was clarified that only plant-based and no other meat alternatives are included. In the

next step, participants indicated their agreement with the variable items. These were further divided into three parts, namely, the original TPB, the remaining predictor variables, and purchase intention. Before the end of the questionnaire, participants were also asked for their demographic information (see Appendix D) and then thanked for their participation.

5. Results

5.1 Descriptive results

For the descriptive results, the meat avoider group was still used to investigate the differences between meat eaters and avoiders. Here, several significant differences were observed that provided some idea about meat avoiders' general beliefs. Regarding the mean value of purchase intention (M = 4.4, SD = 1.8), for instance, meat eaters' responses indicated a possible indecisiveness to slight intent towards buying plant-based meat alternatives in the future. In comparison, vegans and vegetarians were significantly more inclined to purchase PBMA products (M = 6.3, SD = 1.3). Moreover, both groups generally held positive attitudes towards PBMA products with meat avoiders feeling *very* positively towards such products (M = 4.7, SD = 1.5; M = 6.0, SD = 1.3). Next to that, both groups felt similarly high social pressure to purchase PBMA products (M = 5.6, SD = 1.2; M = 5.8, SD = 1.0) and believed to have high behavioral control over the purchase of PBMA products (M = 5.8, SD = 1.1; M = 6.2, SD = 0.7).

Moral obligation to buy PBMA products showed the biggest difference between meat eaters and avoiders. The former group demonstrated rather little moral obligation (M = 3.3, SD = 1.5) while the latter reported a moderate to high one (M = 5.5, SD = 1.3). Participants responded that they have a moderate to high ethical self-identity (M = 5.3, SD = 1.1; M = 6.2, SD = 0.7), and meat eaters anticipate neutral and avoiders rather positive emotions from buying PBMA products (M = 4.0, SD = 1.5; M = 5.0, SD = 1.3). Animal welfare (M = 5.5, SD = 1.3; M = 6.7, SD = 0.6), environmental (M = 5.5, SD = 1.2; M = 6.4, SD = 0.9), and health

concerns (M = 6.5, SD = 0.7; M = 6.6, SD = 0.6) were rated rather high by both groups with vegans and vegetarians being especially concerned about these issues. Lastly, both groups showed little signs of food neophobia (M = 2.6, SD = 1.3; M = 2.3, SD = 1.0).

5.2 Measurement Reliability

In preparation of the regression analysis, the reliability of the model was tested using SPSS 25.0. After deleting nine items based on the alpha value and inter-item correlations, the suggested threshold for Cronbach's alpha ($\alpha \geq .70$; George and Mallery, 2003) was met for all constructs except availability ($\alpha = .65$) and health concern ($\alpha = .66$). As a result, two items from each financial capability and availability were incorporated into the overarching construct perceived behavioral control. Thus, hypotheses 3a and 3b also had to be adapted by merging it into one hypothesis (Hypothesis 3) and omitting the specification of financial capability and availability. Regarding the concept health concern, its reliability can be seen as questionable and further analysis will be carried out to determine whether to include this and other concepts in the regression analysis (George and Mallery, 2003).

Next to that, correlation analysis was also carried out (see Table 2 for Cronbach's alpha and correlation coefficients). Hereby, special focus was laid upon the relationship between health concern and purchase intention. Results showed that the correlation between health concern and purchase intention was quite low and not statistically significant ($r(104) = .19$, $p = .053$). Surprisingly, similar results were found for self-identity ($r(104) = .12$, $p = .230$). Therefore, both factors, including hypothesis 5 and 9, were omitted from further analysis as there seemed to be no significant relationship with purchase intention. Furthermore, both attitude ($r(104) = .85$, $p < .001$) and moral obligation ($r(104) = .70$, $p < .001$) demonstrate possible multicollinearity issues with purchase intention as Pearson's r exceeds the value of .70. Both factors' VIF (variance inflation factor) and tolerance values, however, did not indicate any multicollinearity issues based on the thresholds of VIF > 5 and

tolerance < .1 (Yu et al., 2015). Based on these findings, both factors were still included in the regression analysis.

5.3 Hierarchical multiple regression

Hierarchical regression analysis was performed to determine whether expanding the original TPB with (1) the factors proposed by Conner and Armitage (1998), (2) individual concerns (Marcus et al., 2022), and (3) food neophobia, better predicts purchase intention of plant-based meat alternatives. Thus, four different models were included in the analysis (see Appendix E for results) In Step 1, purchase intention was regressed on the original TPB, including attitude, social norm, and PBC. The three predictors accounted for 72.3% of the variance in purchase intention, $F(3,100) = 87.10$, $p < .001$, $R^2 = .723$, adjusted $R^2 = .715$. Moreover, attitude was the only statistically significant predictor of purchase intention with $\beta = 0.80$ ($p < .001$).

In Step 2, the model was expanded by the factors moral obligation and anticipated emotional outcome and accounted for 78.6% of the variance in purchase intention, $F(5,98) = 71.81$, $p < .001$, $R^2 = .786$ adjusted $R^2 = .775$. Furthermore, the change of R^2 between Model 1 and 2 was statistically significant ($\Delta R^2 = .062$, $p < .001$). Statistically significant predictors of purchase intention included attitude ($\beta = 0.60$, $p < .001$), moral obligation ($\beta = 0.20$, $p = .008$), and anticipated emotional outcome ($\beta = 0.15$, $p = .042$).

The model in step 3 further included animal welfare concern and environmental concern. With the inclusion of those factors, 80.5% of the variance in purchase intention was accounted for, $F(7,96) = 56.65$, $p < .001$, $R^2 = .805$, adjusted $R^2 = .791$. Between Model 2 and 3, the explained variance increased by 2% ($\Delta R^2 = .020$, $p = .010$), and attitude ($\beta = 0.57$, $p < .001$) and moral obligation ($\beta = 0.18$, $p = .019$) were still statistically significant predictors. Additionally, animal welfare concern ($\beta = 0.18$, $p = .004$) was also statistically significant, while anticipated emotional outcome ($\beta = 0.12$, $p = .106$) was not anymore.

Lastly, in step 4 the construct food neophobia was forced into the model. The final model explained 81.4% of the variance, $F(8,95) = 51.91$, $p < .001$, $R^2 = .814$, adjusted $R^2 = .798$. Furthermore, the fourth model still accounted for a small, but statistically significant change in R^2 ($\Delta R^2 = .009$, $p = .037$). Regarding the predictor variables, attitude ($\beta = 0.68$, $p < .001$), animal welfare concern ($\beta = 0.17$, $p = .006$), and food neophobia ($\beta = 0.13$, $p = .037$) demonstrated statistically significant values. Moral obligation ($\beta = 0.14$, $p = .069$), in turn, was now a non-significant predictor of purchase intention.

6. Discussion

This study aims to contribute to the existing scientific landscape about the consumption of meat substitutes like plant-based meat alternatives. There have already been several studies investigating the intention to purchase meat alternatives also using the theory of planned behavior as a guiding framework (e.g. Marcus et al., 2022; Dupont et al., 2022). This study expands on those studies by combining factors from different studies into one larger model that might result in a more complete version. The results reveal that a complex set of factors influences customers' decision-making process in the consumption of plant-based meat alternatives.

6.1 Discussion of general results

The hierarchical regression analysis revealed that the first model, including the TPB's original factors, explained the largest share of variance with more than 70%. This is significantly more than what McEachan et al. (2011) and Armitage and Conner (2001) found in their analyses, but consistent with other studies about food choice that explained 66% of variance in intention to consume meat alternatives (Marcus et al., 2022), 62% of the variance in intention to eat sustainably sourced food (Dowd & Burke, 2013), and 76.6% of the variance in willingness to consume a cultured meat burger (Dupont et al., 2022). Surprisingly,

however, attitude towards purchasing PBMAs was the only significant TPB predictor. This finding confirms hypothesis 1 and the assumption that attitude is the strongest predictor of behavioral intention which is in line with previous studies (Nardi et al., 2019; McDermott et al., 2015). Since there is a very high correlation coefficient between attitude and purchase intention, there might be some multicollinearity issues that explain the highly significant values. Therefore, the findings have to be taken with some caution.

The second factor social norm – or subjective norm in the original TPB – has already been questioned frequently as a relevant factor as its explanatory power is often quite low (Armitage & Conner, 1998; McEachan et al., 2011). Several studies, however, have underlined the importance of the normative component and found significant values in the prediction of food choice (e.g. Marcus et al., 2022; Starr, 2009). In this study, social norm was a highly insignificant factor across all four models, thus, rejecting hypothesis 2. One possible explanation as to why social norm did not predict intention to purchase PBMAs lies in the cultural background of the participants. Cialdini and Goldstein (2004) summarized from several studies that people from collectivist rather than individualistic cultures are more likely to be affected by social pressure. Since Germany has a rather individualistic culture (Darwish & Huber, 2010; Bierbrauer, 1994), this might have affected the factor social norm in the sense that participants did not care as much about whether their peers buy PBMA products or not.

The third and last factor of the TPB, perceived behavioral control, was also found to be insignificant. The two components, financial capability and availability, did not seem to play an important role in the purchase intention of PBMAs. On the one hand, the price of PBMAs might not play as much of a role in the purchase decision anymore as meat prices are rising and meat substitute prices are falling, closing the German price gap to a bit more than 3€ per unit (Statista, n.d.). It might, however, also be that participants were simply unaware of the prices for PBMAs or had difficulties identifying the specific prices for PBMAs instead of

other types of meat substitutes (unknown whether respondents have consumed PBMAs before). Next to that, respondents reported an especially low income, as the most frequent answer was '< 500€.' Thus, participants might be focusing on generally reducing their purchases of meat and/or meat substitutes due to financial reasons as meat-reducing diets are mostly cheaper (Springmann et al., 2021).

On the other hand, availability of PBMAs might not have played as big of a role as initially hypothesized because of meat alternatives' grown market which makes them easy to find in many stores. Moreover, respondents were aged from 18 to 25 and reported a low income which suggests that a great deal of them might be students. Thus, they are probably living in a larger city where their university is situated, which makes it even more likely to find PBMA products. This is consistent with other studies where the products' availability is not an issue (Beldad & Hegner, 2020) and Bray et al.'s (2011) finding that availability issues – in the ethical consumption context – are decreasing with greater popularity. As a result, hypothesis 3 is also rejected.

The extended version of the TPB, including moral obligation and anticipated emotional outcome contributed significantly to the explained variance of purchase intention. This echoes previous findings that expanding the TPB with further factors can increase its explanatory power (Conner & Armitage, 1998). Amongst these factors, moral obligation proved to be a significant predictor in the second and third model, but barely missed the threshold of significance in the final model. This might be related to the small sample size as small sample sizes have proven to affect the analysis (Virtanen et al., 1998). Hence, in a bigger sample, the factor might have also been significant in model 4. Another more surprising is that the introduction of food neophobia seemingly highly influenced moral obligation. This is surprising as food neophobia is not known to affect moral obligation as it does not include an ethical component. Generally, the results of the factor food neophobia

raise several questions which will be discussed later. In total, hypothesis 4 still has to be rejected as it cannot be safely confirmed that moral obligation has a significant effect on intention to purchase PBMAs.

Regarding the other factor, anticipated emotional outcome, it only showed significant values in the second model. After introducing animal welfare concern and environmental concern, the factor did not report a significant *p*-value. Thus, one or both concerns might have accounted for the influence of the anticipated emotional outcome on purchase intention. This makes sense as environmental and animal-welfare issues with meat products have been documented and shared frequently (Gerber et al., 2013; Lentz et al., 2018). Therefore, participants' concern for animals and the environment might have evoked a feeling of pride when purchasing PBMAs. However, it cannot be safely concluded that this is actually the case since there is not enough data to validate this point. Generally, these findings are not in line with previous research by Conner and Armitage (1998), Onwezen et al. (2022), and Arvola et al. (2008) who all advocated for the inclusion of an emotional/affective component in the TPB.

The third model only contributed a small amount to the explained variance, but its addition was still valuable and statistically significant. Moreover, the factor animal welfare concern significantly predicted intention to buy PBMA products in both model 3 and 4, confirming hypothesis 7. This finding is not surprising when considering that most people cite animal welfare issues as the main reason for switching to a meatless diet or reducing their meat consumption (Lentz et al., 2018). Moreover, this is also in line with previous results that concern for animals' welfare can predict diet choice (De Backer & Hudders, 2015) and meat substitute consumption (Götze & Brunner, 2021). However, this is contrary to the recent study by Marcus et al. (2022) which did not find a significant relationship between the concern for animals and purchase intention. Instead attitude fully mediated this relationship.

As the influence of animal welfare concern on attitude was not investigated in this study, we cannot draw any conclusions on this effect. This should, however, be kept in mind for future research.

The environmental implications of traditionally farmed meat have been illustrated through many studies. That environmental concern also affects the intention to substitute traditional meat for meat alternatives has also received more attention in literature (Marcus et al., 2022; Sanchez-Sabate & Sabaté, 2019; Ploll et al., 2020). Participants' intention to purchase PBMAs within this study, however, was seemingly not affected by environmental concern. What is more surprising is that concern for the environment demonstrated a negative effect on purchase intention. Thus, hypothesis 8 cannot be confirmed. These findings are quite surprising but might be explained by Sanchez-Sabate and Sabaté's (2019), and Hartmann and Siegrist's (2017) study which showed that participants were generally not very aware of the environmental implications of meat/benefits of meat substitutes.

While multiple studies have noted that food neophobia might be less relevant for plant-based meat alternatives – as they resemble traditional meat products more than, e.g., insect-based substitutes – (e.g. Dupont et al., 2022) this study has found a significant effect on purchase intention. Although the explained variance in purchase intention is rather small (0.9%), the contribution to the model was significant.

The results, however, also raise several questions as the factor positively affected intention to purchase PBMAs. This is a very surprising finding since it means that being more afraid of novel foods increases purchase intention. A possible explanation is that participants might have misunderstood the questions or other types of methodological problems. Next to that, it might also be that the construct was measuring something else than food neophobia. It might, for instance, be that participants were thinking about the excitement of trying unknown food which might be related to sensation seeking that was found to positively predict

willingness to try insect burgers (Lammers et al., 2019). Overall, these findings have to be interpreted with caution and might be relevant for future research to further investigate the relationship between food neophobia and intention to purchase PBMAs. Moreover, hypothesis 10 cannot be confirmed as food neophobia had a positive instead of a negative effect on purchase intention of PBMA products.

The two factors that were not included in the regression analysis, health concern and self-identity did not show significant correlation coefficients with purchase intention. Thus, both hypotheses were rejected. In the case of health concern, items were taken from a 15-item scale that also included animal rights and environmental motives. Moreover, the answer scale was changed from importance to agreement which might have affected the reliability of the scale. Next to that, the statements might have been too general which could have further affected the scale's reliability.

Regarding self-identity, it was even more surprising that there was no significant correlation between the construct and purchase intention since the items were based on Beldad and Hegner's (2018) study about intention to purchase fair trade products using the extended TPB as a framework. In the study self-identity significantly predicted purchase intention (Beldad & Hegner, 2018). In the present study, an environmentally conscious component was added on to the three items to account for this component in PBMA products. Moreover, the items were – like all other items – translated into German. Although the translator is fluent in English and native in German, translation problems might have significantly affected the construct, leading to its exclusion.

6.2 Practical implications, limitations and directions for future research

These findings give important directions for practitioners. Marketers should carefully consider the market and culture they operate in as it might significantly influence the factors that are relevant for the purchase decision. For rather individualistic cultures, social pressure and the

behavior of others are less relevant than for collectivist cultures which should be kept in mind. Moreover, it is important to further raise awareness about the environmental, health, and animal-welfare issues of meat products and, in turn, highlight the benefits of meat substitutes in these areas. Increased knowledge about the advantages of meat alternatives over traditional meat products can be important in increasing the intention to purchase PBMAs. In general, communication strategies should highlight benefits and appeal to consumers' morals and ethical concerns.

There are several limitations to this study beyond the ones already mentioned. Firstly, the sample characteristics and size raise questions. The sample size only barely meets the minimum requirement, which might have affected the results of this study. Moreover, the study consists of German-speakers, thus, also internationals that are able to speak German. Additionally, due to the snowball sampling approach through different media, many participants are probably living in the Netherlands since many respondents were reached through a platform of the University of Twente. Hence, the difference between the German and the Dutch market might have affected the results which raises questions about the applicability of the findings to the general German market.

Secondly, relationships between the independent variables were not investigated although several studies have already found interesting relationships between predictor variables (Marcus et al., 2022; Dupont et al., 2022). Including these relationships in the model might have changed the results of this study. Relating to that, Dupont et al. (2022) found out that in the case of cultured meat, general attitudes towards cultured meat were completely mediated by specific attitudes towards a certain type of cultured meat product like a cultured meat burger. Hence, it might be the case that participants were thinking of a specific type of PBMA product like a PBMA burger. If the description about the type of PBMA product would have been more specific, results might have been different. Thus, for future research it would be

interesting to find out whether purchase intention of meat alternatives differs amongst specific types of PBMA products. This could also be interesting to marketers as the results could identify products that still require more marketing attention.

Thirdly, in the case of anticipated emotional outcome, there was no specific emotion tested. Using specific emotions like regret or guilt was recommended by Conner & Armitage (1998). However, in some of the construct's items specific emotions were mentioned. Nevertheless, substituting a general emotional component for a more specific one might have influenced the results, possibly leading to a statistically significant value.

Lastly, ethical consumption research consistently deals with the problem of the intention-behavior gap. Within the framework of the TPB, studies have often disregarded the relationship between intention and behavior. However, some studies have identified factors like time or price as inhibitors for people to transform their intentions into actual behavior (Wiederhold & Martinez, 2018). Being aware of this issue means that the findings have to be interpreted with caution. Moreover, investigating actual behavior instead of intention should contribute a great deal to existing research and improve the prediction of meat alternative products purchase intention.

7. Reference list

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-t

Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human Behavior and Emerging Technologies*, *2*(4), 314–324. https://doi.org/10.1002/hbe2.195

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs: Prentice-Hall, Inc.

American Psychological Association. (n.d.). *Ethical consumerism*. Retrieved April 25, 2022, from https://dictionary.apa.org/ethical-consumerism

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, *40*(4), 471–499. https://doi.org/10.1348/014466601164939

Arvola, A., Vassallo, M., Dean, M., Lampila, P., Saba, A., Lähteenmäki, L., & Shepherd, R. (2008). Predicting intentions to purchase organic food: The role of affective and moral attitudes in the theory of planned behaviour. *Appetite*, *50*(2–3), 443–454. https://doi.org/10.1016/j.appet.2007.09.010

Beck, L., & Ajzen, I. (1991). Predicting dishonest actions using the theory of planned behavior. *Journal of Research in Personality*, *25*(3), 285–301. https://doi.org/10.1016/0092-6566(91)90021-h

Beldad, A., & Hegner, S. (2018). Determinants of fair trade product purchase intention of dutch consumers according to the extended theory of planned behaviour. *Journal of Consumer Policy*, *41*(3), 191–210. https://doi.org/10.1007/s10603-018-9384-1

Beldad, A., & Hegner, S. (2020). A steak for supper if the cow did not suffer: Understanding the mechanisms behind people's intention to purchase animal Welfare-Friendly (AWF) meat products. *Journal of Agricultural and Environmental Ethics*, *33*(3–6), 461–486. https://doi.org/10.1007/s10806-020-09834-z

Bierbrauer, G. (1994). Toward an understanding of legal culture: Variations in individualism and collectivism between Kurds, Lebanese, and Germans. *Law & Society Review*, *28*(2), 243–264. https://doi.org/10.2307/3054146

Bryant, C., Szejda, K., Parekh, N., Deshpande, V., & Tse, B. (2019). A survey of consumer perceptions of Plant-Based and clean meat in the USA, india, and china. *Frontiers in Sustainable Food Systems*, *3*. https://doi.org/10.3389/fsufs.2019.00011

Bryant, C., van Nek, L., & Rolland, N. C. M. (2020). European markets for cultured meat: A comparison of germany and france. *Foods*, *9*(9), 1152. https://doi.org/10.3390/foods9091152

Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology*, *28*(15), 1429–1464. https://doi.org/10.1111/j.1559-1816.1998.tb01685.x

Corrin, T., & Papadopoulos, A. (2017). Understanding the attitudes and perceptions of vegetarian and plant-based diets to shape future health promotion programs. *Appetite*, *109*, 40–47. https://doi.org/10.1016/j.appet.2016.11.018

Darwish, A. F. E., & Huber, G. L. (2003). Individualism vs collectivism in different cultures: A cross-cultural study. *Intercultural Education*, *14*(1), 47–56. https://doi.org/10.1080/1467598032000044647

De Backer, C. J., & Hudders, L. (2015). Meat morals: Relationship between meat consumption consumer attitudes towards human and animal welfare and moral behavior. *Meat Science*, *99*, 68–74. https://doi.org/10.1016/j.meatsci.2014.08.011

de Koning, W., Dean, D., Vriesekoop, F., Aguiar, L. K., Anderson, M., Mongondry, P., Oppong-Gyamfi, M., Urbano, B., Luciano, C. A. G., Jiang, B., Hao, W., Eastwick, E., Jiang, Z. V., & Boereboom, A. (2020). Drivers and inhibitors in the acceptance of meat alternatives: The case of plant and Insect-Based proteins. *Foods*, *9*(9), 1292. https://doi.org/10.3390/foods9091292

Deutsche Welle. (2021, October 2). *German youth voted for change — But what does that mean?* DW.COM. Retrieved June 20, 2022, from https://www.dw.com/en/german-youth-voted-for-change-but-what-does-that-really-mean/a-59379884

Diekmann, A., & Preisendörfer, P. (2003). Green and greenback. *Rationality and Society*, *15*(4), 441–472. https://doi.org/10.1177/1043463103154002

Domingo, J. L., & Nadal, M. (2017). Carcinogenicity of consumption of red meat and processed meat: A review of scientific news since the IARC decision. *Food and Chemical Toxicology*, *105*, 256–261. https://doi.org/10.1016/j.fct.2017.04.028

Dowd, K., & Burke, K. J. (2013). The influence of ethical values and food choice motivations on intentions to purchase sustainably sourced foods. *Appetite*, *69*, 137–144. https://doi.org/10.1016/j.appet.2013.05.024

Estell, M., Hughes, J., & Grafenauer, S. (2021). Plant protein and Plant-Based meat alternatives: Consumer and nutrition professional attitudes and perceptions. *Sustainability*, *13*(3), 1478. https://doi.org/10.3390/su13031478

FAO. (2016). *State of the world's forests*. Food and Agriculture Organization of the United Nations.

Faria, A. A., & Kang, J. (2022). It's not just about the food: Motivators of food patterns and their link with sustainable food neophobia. *Appetite*, *174*, 106008. https://doi.org/10.1016/j.appet.2022.106008

Fox, N., & Ward, K. (2008). Health, ethics and environment: A qualitative study of vegetarian motivations. *Appetite*, *50*(2–3), 422–429. https://doi.org/10.1016/j.appet.2007.09.007

George, D., & Mallery, P. (2003). *SPSS for windows step by step: A simple guide and reference, 11.0 update* (4th ed.). Allyn & Bacon.

Gerber, P. J., Steinfeld, H., Henderson, B., Mottet, A., Opio, C., Dijkman, J., Falcucci, A., & Tempio, G. (2013). *Tackling climate change through livestock: A global assessment of emissions and mitigation opportunities*. Food & Agriculture Organization of the United Nations.

Givens, D. (2018). Review: Dairy foods, red meat and processed meat in the diet: Implications for health at key life stages. *Animal*, *12*(8), 1709–1721. https://doi.org/10.1017/s1751731118000642

Gómez-Luciano, C. A., de Aguiar, L. K., Vriesekoop, F., & Urbano, B. (2019). Consumers' willingness to purchase three alternatives to meat proteins in the United Kingdom, Spain, Brazil and the Dominican Republic. *Food Quality and Preference*, *78*, 103732. https://doi.org/10.1016/j.foodqual.2019.103732

Götze, F., & Brunner, T. A. (2021). A consumer segmentation study for meat and meat alternatives in switzerland. *Foods*, *10*(6), 1273. https://doi.org/10.3390/foods10061273

Greene-Finestone, L., Campbell, M., Evers, S., & Gutmanis, I. (2008). Attitudes and health behaviours of young adolescent omnivores and vegetarians: A school-based study. *Appetite*, *51*(1), 104–110. https://doi.org/10.1016/j.appet.2007.12.005

Harris, R. J. (1985). *A primer of multivariate statistics* (2nd ed.). Academic Press.

Hoek, A. C., Luning, P. A., Weijzen, P., Engels, W., Kok, F. J., & de Graaf, C. (2011). Replacement of meat by meat substitutes. A survey on person- and product-related factors in consumer acceptance. *Appetite*, *56*(3), 662–673. https://doi.org/10.1016/j.appet.2011.02.001

Hopwood, C. J., Bleidorn, W., Schwaba, T., & Chen, S. (2020). Health, environmental, and animal rights motives for vegetarian eating. *PLOS ONE*, *15*(4), e0230609. https://doi.org/10.1371/journal.pone.0230609

Hwang, J., You, J., Moon, J., & Jeong, J. (2020). Factors affecting consumers' alternative meats buying intentions: Plant-Based meat alternative and cultured meat. *Sustainability*, *12*(14), 5662. https://doi.org/10.3390/su12145662

Janssen, M., Busch, C., Rödiger, M., & Hamm, U. (2016). Motives of consumers following a vegan diet and their attitudes towards animal agriculture. *Appetite*, *105*, 643–651. https://doi.org/10.1016/j.appet.2016.06.039

Lammers, P., Ullmann, L. M., & Fiebelkorn, F. (2019). Acceptance of insects as food in Germany: Is it about sensation seeking, sustainability consciousness, or food disgust? *Food Quality and Preference*, *77*, 78–88. https://doi.org/10.1016/j.foodqual.2019.05.010

Lentz, G., Connelly, S., Mirosa, M., & Jowett, T. (2018). Gauging attitudes and behaviours: Meat consumption and potential reduction. *Appetite*, *127*, 230–241. https://doi.org/10.1016/j.appet.2018.04.015

Mancini, M. C., & Antonioli, F. (2020). To what extent are consumers' perception and acceptance of alternative meat production systems affected by information? The case of cultured meat. *Animals*, *10*(4), 656. https://doi.org/10.3390/ani10040656

Marcus, N., Klink-Lehmann, J., & Hartmann, M. (2022). Exploring factors determining german consumers' intention to eat meat alternatives. *Food Quality and Preference*, *100*, 104610. https://doi.org/10.1016/j.foodqual.2022.104610

Marquardt, J. (2020). Fridays for Future's disruptive potential: An inconvenient youth between moderate and radical ideas. *Frontiers in Communication*, *5*. https://doi.org/10.3389/fcomm.2020.00048

McDermott, M., Oliver, M., Simnadis, T., Beck, E., Coltman, T., Iverson, D., Caputi, P., & Sharma, R. (2015). The theory of planned behaviour and dietary patterns: A systematic review and meta-analysis. *Preventive Medicine*, *81*, 150–156. https://doi.org/10.1016/j.ypmed.2015.08.020

McEachan, R. R. C., Conner, M., Taylor, N. J., & Lawton, R. J. (2011). Prospective prediction of health-related behaviours with the theory of planned behaviour: A meta-analysis. *Health Psychology Review*, *5*(2), 97–144. https://doi.org/10.1080/17437199.2010.521684

Michaelidou, N., & Hassan, L. M. (2008). The role of health consciousness, food safety concern and ethical identity on attitudes and intentions towards organic food. *International Journal of Consumer Studies*, *32*(2), 163–170. https://doi.org/10.1111/j.1470-6431.2007.00619.x

Nardi, V. A. M., Jardim, W. C., Ladeira, W., & Santini, F. (2019). Predicting food choice: A meta-analysis based on the theory of planned behavior. *British Food Journal*, *121*(10), 2250–2264. https://doi.org/10.1108/bfj-08-2018-0504

Onwezen, M. C., Bartels, J., & Antonides, G. (2013). The self-regulatory function of anticipated pride and guilt in a sustainable and healthy consumption context.

European Journal of Social Psychology, *44*(1), 53–68. https://doi.org/10.1002/ejsp.1991

Onwezen, M. C., Bouwman, E. P., Reinders, M. J., & Dagevos, H. (2021). A systematic review on consumer acceptance of alternative proteins: Pulses, algae, insects, plant-based meat alternatives, and cultured meat. *Appetite*, *159*, 105058. https://doi.org/10.1016/j.appet.2020.105058

Pakseresht, A., Ahmadi Kaliji, S., & Canavari, M. (2022). Review of factors affecting consumer acceptance of cultured meat. *Appetite*, *170*, 105829. https://doi.org/10.1016/j.appet.2021.105829

Pliner, P., & Hobden, K. (1992). Development of a scale to measure the trait of food neophobia in humans. *Appetite*, *19*(2), 105–120. https://doi.org/10.1016/0195-6663(92)90014-w

Ploll, U., Petritz, H., & Stern, T. (2020). A social innovation perspective on dietary transitions: Diffusion of vegetarianism and veganism in austria. *Environmental Innovation and Societal Transitions*, *36*, 164–176. https://doi.org/10.1016/j.eist.2020.07.001

Povey, R., Wellens, B., & Conner, M. (2001). Attitudes towards following meat, vegetarian and vegan diets: An examination of the role of ambivalence. *Appetite*, *37*(1), 15–26. https://doi.org/10.1006/appe.2001.0406

Sanchez-Sabate, R., & Sabaté, J. (2019). Consumer attitudes towards environmental concerns of meat consumption: A systematic review. *International Journal of Environmental Research and Public Health*, *16*(7), 1220. https://doi.org/10.3390/ijerph16071220

Shaw, D., & Shiu, E. (2002). The role of ethical obligation and self-identity in ethical consumer choice. *International Journal of Consumer Studies*, *26*(2), 109–116. https://doi.org/10.1046/j.1470-6431.2002.00214.x

Shaw, D., Shiu, E., & Clarke, I. (2000). The contribution of ethical obligation and self-identity to the theory of planned behaviour: An exploration of ethical consumers. *Journal of Marketing Management*, *16*(8), 879–894. https://doi.org/10.1362/026725700784683672

Springmann, M., Clark, M. A., Rayner, M., Scarborough, P., & Webb, P. (2021). The global and regional costs of healthy and sustainable dietary patterns: A modelling study. *The Lancet Planetary Health*, *5*(11), e797–e807. https://doi.org/10.1016/s2542-5196(21)00251-5

Starr, M. A. (2009). The social economics of ethical consumption: Theoretical considerations and empirical evidence. *The Journal of Socio-Economics*, *38*(6), 916–925. https://doi.org/10.1016/j.socec.2009.07.006

Statista. (n.d.). *Meat - Germany*. Retrieved July 4, 2022, from https://www.statista.com/outlook/cmo/food/meat/germany?currency=EUR

Statista. (2021a, September 27). *Share of adults that do not eat meat by generation in Great Britain 2021*. Retrieved May 10, 2022, from https://www.statista.com/statistics/1179923/share-of-adults-that-do-not-eat-meat-among-generations-in-great-britain/

Statista. (2021b, November 8). *Opinions on meat substitute product qualities among consumers Germany 2020*. Retrieved May 7, 2022, from https://www.statista.com/statistics/1271715/meat-substitute-product-qualities-consumer-opinions-germany/

Statista. (2022, January 21). *Acceptance of vegetarianism or veganism in German society 2017, by age group*. Retrieved June 1, 2022, from https://www.statista.com/statistics/1083378/vegetarianism-and-veganism-acceptance-by-age-group-in-germany-2017/

Thøgersen, J. (2006). Norms for environmentally responsible behaviour: An extended taxonomy. *Journal of Environmental Psychology*, *26*(4), 247–261. https://doi.org/10.1016/j.jenvp.2006.09.004

Tönnies. (2021, February 26). *Tönnies expandiert im Veggie-Markt*. Retrieved June 19, 2022, from https://www.toennies.de/toennies-expandiert-im-veggie-markt/

UNESCO. (2017). *The United Nations world water development report 2017. Wastewater: The untapped resource*. UNESCO.

Virtanen, A., Kairisto, V., & Uusipaikka, E. (1998). Regression-based reference limits: Determination of sufficient sample size. *Clinical Chemistry*, *44*(11), 2353–2358. https://doi.org/10.1093/clinchem/44.11.2353

Wallis, H., & Loy, L. S. (2021). What drives pro-environmental activism of young people? A survey study on the Fridays For Future movement. *Journal of Environmental Psychology*, *74*, 101581. https://doi.org/10.1016/j.jenvp.2021.101581

Wiederhold, M., & Martinez, L. F. (2018). Ethical consumer behaviour in Germany: The attitude-behaviour gap in the green apparel industry. *International Journal of Consumer Studies*, *42*(4), 419–429. https://doi.org/10.1111/ijcs.12435

Wilson Van Voorhis, C. R., & Morgan, B. L. (2007). Understanding power and rules of thumb for determining sample sizes. *Tutorials in Quantitative Methods for Psychology*, *3*(2), 43–50. https://doi.org/10.20982/tqmp.03.2.p043

Wunder, S. (2021, September 7). *Meat substitutes: A new sector emerges*. Heinrich-Böll-Stiftung. Retrieved June 20, 2022, from https://eu.boell.org/en/2021/09/07/meat-substitutes-new-sector-emerges

Yu, H., Jiang, S., & Land, K. C. (2015). Multicollinearity in hierarchical linear models. *Social Science Research*, *53*, 118–136. https://doi.org/10.1016/j.ssresearch.2015.04.008

Zhao, S., Wang, L., Hu, W., & Zheng, Y. (2022). Meet the meatless: Demand for new generation plant-based meat alternatives. *Applied Economic Perspectives and Policy*. https://doi.org/10.1002/aepp.13232

8. Appendix

Appendix A.

Questionnaire text (German)

In dieser Studie geht es um die Faktoren, die deutsche Studenten beeinflussen pflanzliche Fleischalternativen zu kaufen. Dazu wird eine Reihe von Fragen zum Thema gestellt, um möglichst genaue Resultate zu erzielen. Um sicherzustellen, dass die Antworten möglichst präzise sind, werden hier zuerst pflanzliche Fleischalternativen genauer definiert. In dieser Studie sind pflanzliche Fleischalternativen Essensprodukte, die in Name, Form oder Konsistenz traditionellen Fleischprodukten ähneln. Dazu zählen z.B. veganes Schnitzel, vegane Wurst, vegane Burger patties, oder auch vegane Leberwurst und vegane Salami. Allerdings zählen diese nur dazu, wenn die Produkte auf pflanzlicher Basis produziert wurden (aus Soja, Hülsenfrüchten, etc.). Andere Alternativen zu traditionellen Fleischprodukten auf Basis von z.B. Insekten o.ä. werden nicht dazugezählt.

Appendix B.

Questionnaire items

Questionnaire for bachelor thesis – Hannes Neumeister

Demographic characteristics

What is your nationality?

- German
- Dutch
- Other

What is your age?

- _____

What is your monthly income?

- < 500€
- 500-750€
- 750-1000€
- > 1000€
- Prefer not to say

What is your highest level of education obtained?

- Hauptschulabschluss
- Realschulabschluss
- (Fach-)Abitur
- (Fach-)Hochschulabschluss

Which diet are you currently following?

- Vegan (consuming no animal products, including milk, eggs, honey and meat)
- Vegetarian (consuming no meat products)
- Flexitarian (consciously trying to reduce meat consumption and only eating meat seldomly or with high quality/standards)
- Omnivore (eating everything including all animal products)

Dependent variable

Purchase intention

I am planning to buy plant-based meat alternatives products in the future.

The next time that I will do my shopping, I will buy plant-based meat alternatives products.

I am planning to consciously buy plant-based meat alternatives products instead of meat products.

Independent variables

Theory of planned behavior

Attitude

For me to eat plant-based meat alternatives on a regular basis in the future would be…

1: extremely bad to 7: extremely good

1: extremely unpleasant to 7: extremely pleasant

1: extremely harmful to 7: extremely beneficial

1: extremely unenjoyable to 7: extremely enjoyable

Perceived behavioral control

Availability of plant-based meat alternatives (PBMA) products

I know where I can buy plant-based meat alternatives products.

Plant-based meat alternatives products are sold in shops in my neighborhood.

I don't have to spend so much time looking for shops that sell plant-based meat alternatives products.

Financial capacity

I can afford to buy plant-based meat alternatives products.

I am financially able to buy plant-based meat alternatives products.

I am willing to pay more for plant-based meat alternatives products.

Social norms

I am aware that people in my social circle buy plant-based meat alternatives products.

I observe that more people in my town or city buy plant-based meat alternatives products.

I notice that more people are buying plant-based meat alternatives products.

Expanded theory of planned behavior

Moral obligation to purchase PBMA products

I feel it as my moral duty to regularly buy plant-based meat alternatives products.

I feel it as a moral duty to buy plant-based meat alternatives products.

I feel it is wrong to buy food products that are not plant-based.

Self-identity

I see myself as someone who is concerned about ethical issues.

I see myself as an ethical consumer.

I see myself as someone who is concerned about social issues.

I consider myself as an environmentally conscious consumer.

Other product factors

Health attitude

I want to be healthy.

I want to live a long live.

I care about my body.

My health is important for me.

Animal welfare concern

Increased regulation of the treatment of animals in farming in Germany is needed.

Livestock farming raises serious ethical questions about the treatment of animals in Germany.

In general, humans have too little respect for the quality of life of animals.

It is important that the food I normally eat has been produced in a way that animals have not experienced pain.

It is important that the food I normally eat has been produced in a way that animals' rights have been respected.

Environmental concern

I am afraid when I think about environmental conditions for future generations.

If we continue our current style of living, we are approaching an environmental catastrophe.

In my opinion, environmental problems are greatly exaggerated by proponents of the environmental movement. (reversed)

To protect the environment, we all should be willing to reduce our current standard of living.

Positive emotional outcome

If I were to buy plant-based meat alternatives products, then I would feel proud/worthy/exceptionally good.

If I were to buy plant-based meat alternatives products, then I would feel guilty/feel remorseful/have a bad conscience. (reversed)

My purchasing a plant-based meat alternative product will result in my peace of mind.

Neophobia toward plant-based meat

I don't trust new foods like plant-based meat.

If I don't know what a food is, I won't try it.

Plant-based meat tastes too weird to eat.

I am afraid to eat things I have never had before like a type of plant-based meat.

I am very particular about the foods I eat like plant-based meat.

Appendix C.

Systematic search log

Date	Database	Search string	Total hits	Remarks
21-03-22	*Google scholar*	Theory of planned behavior	*2,300,000*	*I spotted several relevant articles including the original article and multiple meta-analyses*
21-03-22	*Google scholar*	Ethical consumption		
14-03-22	*Google scholar*	"meat alternatives" AND "gen z"	*45*	*This was not very helpful as it did not give me many relevant articles. But I also turned away from this search.*
01-04-22	*Google scholar*	meat alternatives prices	*166,000*	*This was more to give me an overview and an idea of what kind of studies there are about pricing of meat*

				alternatives. I found multiple useful studies.
04-04-22	Google scholar	(health* OR nutritio*) AND (attitude*) AND ('plant-based meat alternatives')	17,600	This was a very helpful search as I could identify multiple articles that perfectly fit what I was searching for
07-04-22	Google scholar	animal welfare concern AND plant-based meat alternatives	21,500	I found several good articles on the first, but especially later pages
21-04-22	Google scholar	food neophobia plant-based food	2,290	Results were not very precise but after some time I still found relevant articles that helped me.
22-04-22	Google scholar	food neophobia meat alternatives purchase intention	14,800	This was more precise and a bit more helpful and I was then able

				to gather the rest of the literature.

General note: A large part of my literature search was defined by snowballing off the references from helpful articles. This is mostly why my search log is not very long.

Appendix D.

Demographic information of sample

Table 1

Complete demographic information of respondents

Demograhic characteristics	Frequency			Total percentage
	Meat eaters	Meat avoiders[a]	Total	
Nationality				
German	96	37	133	93.7
Dutch	6	1	7	4.9
Others	2	0	2	1.4
Income				
< 500€	35	13	48	33.8
500-750€	18	14	32	22.5
750-1000€	29	8	37	26.1
> 1000€	12	2	14	9.9
Prefer not to say	10	1	11	7.7
Age				
18-19	3	5	8	5.6
20	27	5	32	22.5
21	43	14	57	40.1
22	16	11	27	19.0
23-25	14	3	17	12.0
N.A.	1	0	1	0.7
Education (low to high)				
Hauptschulabschluss	1	2	3	2.1
Realschulabschluss	2	0	2	1.4
(Fach-)Abitur	87	30	117	82.4
(Fach-) Hochschulabschluss	14	6	20	14.1
Diet				
Vegan	0	7	7	4.9
Vegetarian	0	31	31	21.8
Flexitarian	54	0	54	38.0
Omnivore	50	0	50	35.2

Table 1

Complete demographic information of respondents

Demograhic characteristics	Frequency			Total percentage
	Meat eaters	Meat avoiders[a]	Total	
Total	104	38	142	100

[a] Meat avoiders are not included in the hierarchical regression analysis.

Appendix E.

Hierarchical regression analysis table

Table 2

Complete hierarchichal regression model

		Coefficients[a]					
		Unstandardized Coefficients		Standardized Coefficients			
Model		B	Std. Error	Beta	t	Sig.	Zero-order correlation
1	(Constant)	-1.19	0.58		-2.035	.044	
	Attitude	0.93	0.07	0.80	13.818	.000	.85
	Social norm	0.08	0.08	0.05	0.908	.366	.41
	Perceived behavioral control	0.13	0.09	0.08	1.422	.158	.33
2	(Constant)	-1.249	0.52		-2.404	.018	
	Attitude	0.70	0.07	0.61	9.630	.000	.85
	Social norm	0.04	0.07	0.03	.521	.604	.41
	Perceived behavioral control	0.11	0.08	0.07	1.342	.183	.33
	Moral obligation	0.24	0.09	0.20	2.700	.008	.71
	Anticipated emotional outcome	0.17	0.08	0.15	2.029	.045	.68
3	(Constant)	-1.45	0.62		-2.324	.022	
	Attitude	0.67	0.07	0.58	9.393	.000	.85
	Social norm	0.05	0.07	0.03	0.632	.529	.41
	Perceived behavioral control	0.11	0.08	0.06	1.342	.183	.33
	Moral obligation	0.21	0.09	0.18	2.412	.018	.71
	Anticipated emotional outcome	0.14	0.08	0.12	1.636	.105	.68
	Animal welfare concern	0.23	0.08	0.18	2.979	.004	.62

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Zero-order correlation
		B	Std. Error	Beta	t	Sig.	
	Environmental concern	-0.13	0.08	-0.09	-1.674	.097	.36
4	(Constant)	-2.39	0.75		-3.189	.002	
	Attitude	0.79	0.09	0.68	8.932	.000	.85
	Social norm	0.04	0.07	0.03	0.526	.600	.41
	Perceived behavioral control	0.10	0.08	0.06	1.305	.195	.33
	Moral obligation	0.17	0.09	0.14	1.875	.064	.71
	Anticipated emotional outcome	0.14	0.08	0.12	1.676	.097	.68
	Animal welfare concern	0.22	0.08	0.17	2.886	.005	.62
	Environmental concern	-0.09	0.08	-0.06	-1.176	.243	.36
	Food neophobia	0.18	0.08	0.13	2.175	.032	-.39

a. Dependent Variable: Purchase intention