How social models impact protein choice

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Abstract

To make our diets more sustainable and healthier, meat consumption should be reduced. Social norms can affect food choices through modelling. There is some evidence of modelling effects on protein choice. This study aims to test the effect of different social models on protein choice. It adds to the literature by including a measure of social tie strength, a meat substitute option and a measure of the remote models a respondent is exposed to. A hypothetical choice experiment is conducted among (mostly) Dutch students who consume meat (n=125). Using the data, the following research questions are answered: How do social models influence protein choice? How does the presence of a remote social model impact the modelling of protein choice? How does the strength of the social tie between the social model and the respondent moderate the modelling process? What are the drivers to model protein choice? How does protein choice affect the modelling process? The evidence of modelling in this study is limited. For one out of three dishes, there is some evidence of modelling. What people around the respondent usually eat and the meat consumption of respondents have strong effects on protein choice. Social tie strength does not moderate the modelling process, and there is no evidence of modelling specifically for meat substitutes. The literature identifies three potential drivers: affiliation, appropriateness and quality concerns. These are included in the final models as mediators. The models provide no evidence of mediation.

Contents

1. Introduction

The scientific consensus is that meat consumption should be significantly reduced as soon as possible (González et al., 2020). Meat consumption is linked to various environmental and human health problems. Environmental problems include global warming, water scarcity, water pollution and water footprint. Health problems include carcinogenicity, cardiovascular diseases and viral infections (González et al., 2020).

Human-induced global warming is one of the biggest problems of the 21st century (IPCC, 2018). To minimize its impact, greenhouse gas (GHG) emissions must be drastically reduced. The livestock industry contributes 12-18% of global GHG emissions (González et al., 2020). Multiple LCA studies have confirmed that consuming meat, especially processed and red meat, leads to higher GHG-emitting diets (González et al., 2020). Additionally, the livestock industry contributes to water scarcity and pollution and has a negative effect on the water footprint (Farchi et al., 2017). Reducing meat consumption is therefore seen as one of the keys to a more sustainable diet. Meat consumption is also linked to human health problems. Meat consumption has been linked to various types of cancer, kidney disease, diabetes (González et al., 2020), cardiovascular disease (Battaglia Richi et al., 2015) and the spread of certain viruses (González et al., 2020). Therefore, decreasing meat consumption would be better for people and the planet.

People should eat less meat but instead are eating more (Our World in Data, 2020). Many studies have been conducted on this problem. Meat consumption is influenced by many different factors. Macro-level factors such as culture, as well as personal factors such as habits and taste, can influence this behavior (Onwezen et al., 2021; Stoll-Kleemann & Schmidt, 2017). The most reported barriers in the literature include food neophobia, identity incongruence, habitual behavior, price, sensory aspects (texture or flavor), culture, convenience, unavailability and unfamiliarity. Drivers include familiarity, health concerns, environmental concerns, animal welfare and social norms (Carlsson et al., 2022; Hielkema & Lund, 2021; Hoek et al., 2011; Onwezen et al., 2021). These factors work differently for different types of consumers (Hielkema & Lund, 2021). Multiple studies note the existence of a group that eats a lot of meat. This group has a high attachment to meat and generally has no intention of reducing their consumption (Bogueva et al., 2022; Dagevos, 2021; Hielkema & Lund, 2021; Hoek et al., 2011; Lacroix & Gifford, 2019, 2020; Lemken et al., 2019; Malek et al., 2019; Onwezen et al., 2022). In this study, this group will be referred to as “meat lovers”. Meat lovers are a group that is responsible for a large portion of the meat consumption and have the most room to improve their diets (Dagevos, 2021; Lemken et al., 2019). Therefore, they are a key group in reducing meat consumption (Mistry et al., 2020). However, it has proven to be difficult to get meat lovers to reduce their meat consumption (Bogueva et al., 2022; Lemken et al., 2019). Social norms have been shown to be effective in reducing meat consumption, even in people with no intention to do so (Bogueva et al., 2022; Lemken et al., 2019; Onwezen et al., 2022). Social norms increase acceptance of meat substitutes (Onwezen et al., 2022), provide people with information on what constitutes acceptable behavior and present an opportunity for affiliation (Higgs & Thomas, 2016; Robinson et al., 2013).

Social norms can affect meat consumption through modelling (Christie & Chen, 2018). Modelling refers to the adjusting of ones eating behavior when eating together based on the eating behavior of the other. (Higgs & Thomas, 2016; Robinson et al., 2013). This effect has been studied thoroughly for food intake. The norm set by a social model has a robust effect on food intake (Cruwys et al., 2015; Higgs & Thomas, 2016; Robinson et al., 2013; Vartanian et al., 2015). The effect on food choice is studied less. The studies that have been conducted have generally found significant effects of modelling on food choices; respondents model the food choice of the social model more often than chance would predict (Christie & Chen, 2018; Cruwys et al., 2015; Einhorn, 2020; Garcia et al., 2021).

Studies differentiate between using remote and direct social models. Direct social models are physically present, while remote social models are not (Cruwys et al., 2015). A direct social model has been shown to have an effect on main dish choice. This effect was present for both meat and vegetarian dishes (Christie & Chen, 2018). No study has used a remote social model on main dish choice. Solely using a remote social model in a real-life setting is difficult. However, if a remote social model can induce the modelling of protein choice, this could have large implications. Remote social models are easier and less costly to use. They could be more widely applicable than norms set by direct social models. It is, therefore, quite relevant to test the potential of remote norms. When using direct social models on food choice, studies differentiate between familiar and unfamiliar social models. For both types, there is evidence of modelling (Cruwys et al., 2015; Garcia et al., 2021; Kaisari & Higgs, 2015). Within familiar social models, no differentiation is made between different social ties. For example, a distant acquaintance and a romantic partner are put in the familiar group. There is some evidence from food intake modelling and social norm literature that the strength of a social tie could moderate the effect a social norm has (de Castro, 1994; Pachucki et al., 2011). Therefore, it is relevant to investigate whether social tie strength moderates the modelling effect on protein choice.

Whether modelling also takes place when the norm is to choose a meat substitute has also never been studied. Meat substitutes are expected to become an important part of our diet in the coming years (Aiking, 2011; Aiking & de Boer, 2020). They should make it easier for consumers to reduce their meat consumption. Meat substitutes are generally considered to be healthier and more sustainable than meat (Aiking, 2011; Aiking & de Boer, 2020; Kumar et al., 2017). Meat substitutes are available in different kinds. Some try to emulate meat, while others try to be an alternative to meat without trying to be meat. Generally, the meat substitutes that are similar to meat are targeted more at meat eaters that do not fully want to give up meat, while the alternatives are more targeted at people that do not want to eat meat (Kerslake et al., 2022). Hielkema & Lund (2021) note that small changes to existing meals might persuade people with no intention to reduce their meat intake. Meat substitutes can play an important role in achieving this. Bianchi et al. (2022) find that when meat eaters become familiar with meat substitutes, they considerably reduce their meat consumption. However, a large group of consumers is still unwilling to try these substitutes (Lemken et al., 2019). Social norms are important in the acceptance of meat substitutes (Onwezen et al., 2022). If people model the choice of a meat substitute, this information can be used to further the protein transition.

This study aims to study the effects of social eating norms, presented by different social models, on protein choice. These effects are understudied but show promising results. This study will look at the difference in the modelling of protein choice for weak and strong social ties. Additionally, the effect of different remote norms on the modelling process will be studied. This is done by conducting a hypothetical choice experiment which is designed to test the research questions below. The hypothetical choice experiment will ask students 1) to think of either a weak or strong social tie, 2) to choose their preferred protein for three dishes, 3) their regular eating situation and diet and 4) some demographics.

Research question: How do social models influence protein choice?

Sq1: How does the presence of a remote social model impact the modelling of protein choice?

Sq2: How does the strength of the social tie between the social model and the respondent moderate the modelling process?

Sq3: What are the drivers to model protein choice?

Sq4: How does protein choice affect the modelling process?

2. Theoretical framework

2.1. Social norms

Food choice is a complex process that is influenced by many different factors (Furst et al., 1996; Higgs & Thomas, 2016). One factor that plays an important role throughout the literature is social norms (Cavazza et al., 2011; de Castro, 1994; Higgs & Thomas, 2016; Horgan et al., 2019; Pachucki et al., 2011; Ruddock et al., 2019; Salmivaara et al., 2021; Šedová et al., 2016; Vandermoere et al., 2019). Social norms have been defined as “rules and standards that are understood by members of a group, and that guide and/or constrain human behavior without the force of laws ” (Cialdini and Trost, 1998, p.152). Social norms can be divided into descriptive and injunctive norms. Descriptive norms can be observed; they refer to the actions people around us take. From these actions can be derived what is normal and accepted. Injunctive norms refer to what someone believes others approve and disapprove of. They are based on what should be done instead of what is actually done. (Cialdini & Trost, 1998). Within the context of food choice, eating norms are most important. “Social eating norms are perceived standards for what constitutes appropriate consumption, whether that be amounts of foods or specific food choices, for members of a social group.”(Higgs, 2015). In research regarding eating behavior, descriptive norms typically have a stronger effect than injunctive norms (Robinson et al., 2013).

2.2. Modelling

The nutritional literature posits that social influence affects food choices and intake through modelling. Modelling refers to the adjusting of ones eating behavior when eating together based on the eating behavior of the other. This effect is present in amount, but also type of food consumed (Higgs & Thomas, 2016). Modelling is assumed to occur because people look to other people’s eating behavior as an indicator of a social norm (Herman et al., 2003). A lot of research has been done regarding the modelling of food intake. A meta-analysis concludes that modelling has a robust and powerful effect on food intake (Vartanian et al., 2015). Vartanian et al. (2015) also report no difference between direct and remote norm sources. Another review adds to this by including modelling of food choices. They find that most studies show that modelling also occurs for food choice. Two studies find no evidence for food choice modelling in all but one of their experiments. These studies represent a small portion of the literature and had quite small sample sizes, but should not be disregarded (Cruwys et al., 2015). Pliner & Mann (2004) included unpalatable food in their experiments. They found some evidence of modelling for palatable food but not for unpalatable food. It could well be the case that modelling does not affect unpalatable food because of strong preexisting preferences. Hendy & Raudenbusch (2000) looked at children modelling their teachers and only reported null findings when using “silent teacher modelling” or including competing peers. These settings are quite specific and should not discredit food choice modelling as a whole. Most studies regarding the modelling of food choice focus on snacks and use a remote model. More recently, a study explored food choice modelling of main dishes. They report that main dishes are significantly influenced by modelling (Christie & Chen, 2018). This is the first and only study of its kind, and it shows that modelling is potentially more widespread than previously thought. It is also one of two studies that specifically include protein choice. Christie & Chen (2018) observed main meal choices in an on-campus café. The café offers two main meal options, one vegetarian option and one meat option. By observing these choices, they show that people are more likely than chance alone would predict to order the same dish as the person before them (the social model). Einhorn (2020) shows that omnivores sometimes model the protein choice of their vegetarian co-eaters. Based on this evidence and the literature on food choice and intake modelling in general, the following hypothesis is made:

H: Social models can influence protein choice through modelling

2.3. Remote and direct models

Within the sources of social eating norms, a distinction can be made between direct or remote norm sources (Roth et al., 2001). A direct norm source is someone that is physically present when making a choice; this person can be observed and can observe the respondent as well. An example of this is a friend or stranger that is with you when you order food in a restaurant. This type of source has high contextual specificity (Einhorn, 2020). A remote norm source is not physically present when making a choice. A remote norm source can take many forms. An example can be a campaign on a national level that promotes healthy or sustainable eating or environmental clues such as empty food packaging (Prinsen et al., 2013). Some studies use a social model who is making a choice or eating, shown through a screen; this is still considered remote since the social model is not physically present (Cruwys et al., 2015). Remote norm sources have lower contextual specificity (Einhorn, 2020). The research regarding the effect of social eating norms on food choice can be divided into studies using direct norms and studies using remote norms.

Studies using remote norm sources have some mixed findings. Food intake modelling studies find that remote models still lead to modelling, sometimes even to the same extent as direct models (Cruwys et al., 2015; Robinson et al., 2013). Studies using descriptive norms to promote healthy food choices, set by textual information, find significant effects (Burger et al., 2010; Jun & Arendt, 2020; Mollen et al., 2013). Demarque et al. (2015) find that remote descriptive norms have a positive influence on sustainable consumption in an online supermarket. However, some studies find no effect of remote norms on meat consumption (Brachem et al., 2019; Einhorn, 2020).

Studies using direct norm sources generally find strong results. Food intake modelling literature has found strong evidence for the influence of modelling (Cruwys et al., 2015; Vartanian et al., 2015). Salmivaara et al. (2021) find that descriptive norms set by other people in the restaurant affect sustainable food choices. Christie & Chen (2018) find evidence that a direct model leads to significant modelling of main food choices. This effect was present for both meat and vegetarian choices. Einhorn (2020) concludes that people, regardless of their meat consumption, model vegetarian food choices of eating partners.

So far, remote and direct norms have only been studied separately. Separately, both are shown to have an effect. However, it is possible that remote and direct norms have different effects when both are present. A remote norm could strengthen a direct norm when they are in line and present the same norm. When a social model chooses a dish without meat, and a descriptive remote norm informs the respondent that most people choose dishes without meat, this can make the norm more salient. It provides general information regarding the norm in a certain situation and shows an example of this norm being followed. When the social model chooses a dish containing meat and goes against the remote norm, the respondent is faced with conflicting norms. The respondent can choose to follow the more general remote norm or follow the more specific direct norm. Roth et al. (2001) observe the behavior of women faced with conflicting remote norms. The women are presented with a norm set by prior participants, who either ate a few cookies or many cookies. When left alone, the women modelled this norm. However, when they were observed, the women ate few cookies regardless of the norm. Roth et al. (2001) argue that, when observed, the women followed the general norm that women should eat minimally, in order to show themselves in a positive light. This general norm conflicted with the specific norm of eating many cookies set by prior participants. Although this is not an exact example of a remote norm overruling a direct norm, it does show that a more general norm has the potential to influence behavior even when people are faced with a specific norm. Therefore, it is possible that respondents are less likely to model a meat choice when faced with a general norm of eating vegetarian. This leads to the following hypotheses:

H1.1: The presence of a remote vegetarian eating norm will increase the likelihood of modelling vegetarian choices

H1.2: The presence of a remote vegetarian eating norm will decrease the likelihood of modelling meat choices

2.4. Social tie theory

Most direct food intake modelling studies only look at modelling between two strangers, classified as unfamiliar (Cruwys et al., 2015). Studies that do use people who know each other find that modelling still occurs when people are familiar with each other (Cruwys et al., 2015; Garcia et al., 2021; Kaisari & Higgs, 2015). These studies only differentiate between familiar and unfamiliar social models. From the food intake literature, it can be concluded that modelling occurs when presented with a familiar and an unfamiliar social model. One study concluded that modelling was stronger for familiar people than unfamiliar (Salvy et al., 2007). The food choice modelling literature mostly uses unfamiliar social models (Cruwys et al., 2015). The exceptions are studies using children. One study finds that children model the food choices of their parents more than those of strangers (Harper & Sanders, 1975). Christie & Chen (2018) explicitly drop any participants with a relationship to the model to ensure full randomization of exposure. They find that strangers model the food choice of the person ordering before them. This effect is present in both meat and vegetarian dishes. Einhorn (2020) only uses familiar models due to the setting of the study. She concludes that people model vegetarian eating norms from their familiar eating partners.

Within the category of familiar people, there are many different types of social ties. A distant acquaintance and romantic partner are both familiar people but have very different relationships. In food intake modelling, there is some evidence that this difference matters. De Castro (1994) notes that the presence of friends and family leads to more food being consumed than the presence of other eating companions. In food choice modelling studies, no distinction within familiar models has been made. The literature on social eating norms emphasizes that the effects of norms depends on the “closeness” of the source (Higgs & Thomas, 2016). It is therefore important to define who is “close” and who is not. Social tie theory distinguishes between weak and strong social ties. There are different ways this distinction is made. Granovetter (1973) uses a combination of amount of time, intensity, intimacy and reciprocity within the tie to determine its strength. Others just use frequency of interaction or labels such as friends, family and coworkers (Krackhardt, 1992). The importance of strong and weak ties is debated in the literature. It is argued that strong ties mostly exist between similar people and, therefore, will not expose people to new influences. Weak ties form bridges between different social groups and can provide people with different perspectives (Granovetter, 1973). However, because strong ties form a closer network, they might attach more weight to each other’s input, similar to in-group vs out-group. Strong ties also seem to be more important when people are faced with uncertainty (Krackhardt, 1992; Rademacher & Wang, 2014). Weak ties might lack reciprocity and trust, undermining the significance of each other’s input.

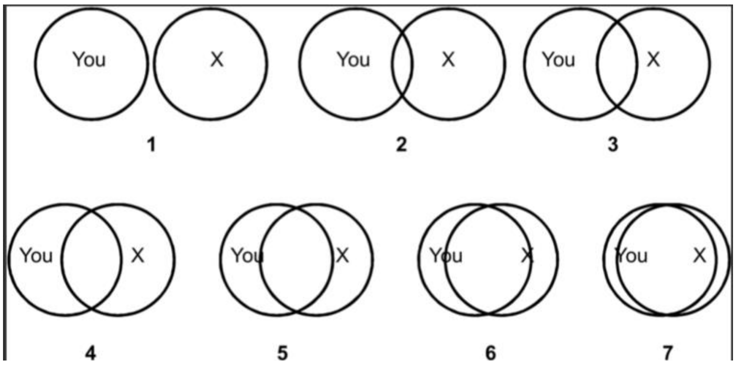
There are studies that look at the effect of different social ties on food choices. Table 1 summarizes studies that measure these effects. This table shows that ties like partner, friend and family have been used the most. These relationships fall under strong ties. Colleagues and classmates have been characterized as weak ties (Hielkema & Lund, 2021). Strong ties are studied more than weak ties. This could be due to the fact that strong ties interact more often and more intimately. This means that they eat together more often than weak ties. Colleagues and classmates are an exception to this because of practical circumstances. Colleagues and classmates are typically together during some meal moments, such as lunch or certain work-related dinners (Sobal & Nelson, 2003).

Table 1. Social ties in food choice literature

Tie	Studies	Strength of effect
Partner	(Pachucki et al., 2011) (Vandermoere et al., 2019) (Zey & McIntosh, 1992) (Sharps et al., 2021) (de Castro, 1994)	Strongest
Housemate/ household	(Vandermoere et al., 2019) (Furst et al., 1996)	Same as partner
Friends	(Pachucki et al., 2011) (Šedová et al., 2016) (Vandermoere et al., 2019) (Zey & McIntosh, 1992) (Sharps et al., 2021) (de Castro, 1994)	Slightly weaker than partner
Sibling(s)	(Pachucki et al., 2011)	Weaker than partner
Family member	(Vandermoere et al., 2019) (de Castro, 1994; Furst et al., 1996)	Similar to friend
Colleagues/fellow students	(Salmivaara et al., 2021; Šedová et al., 2016)	Significant but not as strong as partner

In the current study, the Inclusion of the other in the self (IOS) scale (figure 1) is used to measure closeness and differentiate between weak and strong social ties. Gächter et al. (2015) created and tested this scale as a measure of subjective closeness of relationships. Using this scale prevents different interpretations of categories such as friend. To properly distinguish between a weak and a strong social tie, the scores 2 and 6 are used to describe the closeness of the relationship.

Figure 1. Inclusion of the other in the self scale



Gächter et al. (2015)

2.5. Strong vs weak ties

From the studies in Table 1, it can be concluded that food choices of strong social ties affect food choices more than food choices of weak ties. A possible explanation is offered when combining the findings of modelling and social tie literature. Granovetter (1973) states that strong social ties are, in general, quite similar to each other in attitudes, culture and demographics. The stronger the tie, the more similar people are. Cruwys et al. (2015) find that the effects of modelling are stronger when people are similar to each other. So if strong ties are similar to each other, it is likely that they model each other's food choices. Additionally, people are more likely to model when faced with uncertainty (Christie & Chen, 2018; Robinson et al., 2013). Social tie theory states that, when faced with uncertainty, people are more likely to resort to strong social ties to reduce their uncertainty

(Granovetter, 1973). Based on these findings, it appears that in the scenario where modelling is most likely to happen, strong ties will have the strongest effects. People also value the opinions of strong ties more than those of weak ties (Krackhardt, 1992). People might attach more weight to the norms set by strong ties than the norms set by weak ties. If a strong tie does not approve of meat consumption, this might affect them more than when a weak tie disapproves.

Strong social ties interact more often than weak social ties. This translates into eating together more often. Therefore, they know each other, and their eating behavior's better than weak ties. Since they are strong ties, these eating behaviors are often accepted by one another. This does not create uncertainty and limits the chances of social sanctions. Weak ties might not know each other's eating behavior. Eating with a vegetarian acquaintance creates uncertainty about how they might react to someone's meat consumption and could cause fear of social sanctions. This strengthens the effect of social eating norms and could lead to the modelling of protein choice. This allows the prevention of possible sanctions and the projection of a positive self-image.

Based on the social tie literature, the following hypotheses are made:

H2.1: A stronger social tie will increase the modelling effect on protein choice

H2.2: A higher degree of uncertainty will increase the modelling effect on protein choice

2.6. Why do people model

There are different explanations for why people model the eating behavior of others. The literature posits two main pathways through which norms set by models influence eating behavior. The first is modelling for appropriateness. When modelling for appropriateness, people are uncertain about what to do and look to the behavior of other people to set a norm for appropriate behavior (Christie & Chen, 2018; Robinson et al., 2013). People do not want to be "wrong" in their food choice or intake. When they are uncertain about what is "right", they use the choices of others as a reference point (Higgs & Thomas, 2016). Modelling is a shortcut for trial and error. The idea is that copying a food choice might lead to the best choice in that situation. This theory suggests that uncertainty should promote modelling. When people are uncertain, they attribute more value to the present norm and are more likely to follow it (Robinson et al., 2013). This effect is stronger when people are similar to each other. When people are very dissimilar, they often deem it inappropriate to model each other's norms (Cruwys et al., 2015; Robinson et al., 2013). Being dissimilar does not remove the modelling effect. However, the effect is more pronounced when people are similar in age, sex and weight (Cruwys et al., 2015). The second pathway is modelling for affiliation. When modelling for affiliation, people model food choice or intake in order to be more likeable and present themselves in a positive light (Christie & Chen, 2018; Herman & Polivy, 2005; Higgs & Thomas, 2016; Robinson et al., 2013). By modelling, they signal to be part of a group and can prevent possible social sanctions (Higgs, 2015).

These explanations assume that people are influenced by the social information gathered by observing the choice of the social model. Information regarding other relevant drivers or barriers could also play a role. People often look at the choices of others as indicators of quality (Bikhchandani et al., 1998). When observing a social model choosing a certain dish, people could infer that this dish is likely to be of high quality (i.e., tasty). Furthermore, the choices of others reduce uncertainty regarding quality (Goedegebure et al., 2017). People do not want to be disappointed by the quality of their choice. They can use the choices of others to reduce the uncertainty of the quality surrounding their options. If a social model chooses a certain dish, it is less likely that this dish is of low quality (i.e., poor taste). Even though this dish may not have the highest quality, it is unlikely to disappoint. Meat substitutes are generally evaluated less positively than meat (Onwezen et al., 2021). When people are exposed to positive ratings of meat substitutes by others, the expected quality of the meat substitute increases (Berger et al., 2019). This explanation assumes that modelling may also be motivated by quality concerns rather than social concerns. Whether this explanation holds for only one choice is uncertain. Goedgebure et al. (2020) find that a popularity clue can increase the chance of purchasing light products and not regular products. However, one choice may not have the same weight as a popularity clue that summarizes many choices. Huh et al. (2014) find that when someone observes a person make a choice, the option chosen becomes a social default. This means that the option chosen (the social default) is the option that will be considered first and assumed to be the status quo. Social defaults are chosen more often than alternatives. This evidence suggests that even one choice may be enough to provide information that influences choice.

Another explanation from the food intake modelling literature is that people model unconsciously (Christie & Chen, 2018; Garcia et al., 2021; Koordeman et al., 2011; Roth et al., 2001). People might still be modelling for appropriateness or affiliative concerns while being unaware or unwilling to report it (Christie & Chen, 2018; Garcia et al., 2021). It could also be behavioral mimicry. Behavioral mimicry refers to the mechanism of observing someone perform an action and then performing the action yourself (Robinson et al., 2013). In food intake modelling, people mimic the act of taking a bite, which can lead to eating similar amounts. Modelling of food intake has also been observed when using remote norms, such as empty food packaging (Higgs, 2015). This suggests that modelling is not exclusively caused by mimicry, as there is nothing to mimic. There is little research on the effects of mimicry on food choice. Food choice is a more conscious choice than food intake; it is a mental process and does not include a physical action that can be mimicked (Robinson et al., 2013). Therefore, it is less likely to be subject to mimicry.

When people model a remote norm source, and no direct norm source is present, it is less likely to be due to affiliative concerns. There is no one present to affiliate with. Modelling a remote norm could be explained by modelling for appropriateness or quality concerns. A remote norm can still provide information about what is considered appropriate behavior in an uncertain situation and signal quality. When people model a stranger, it is still unlikely that they are modelling for affiliative concerns. Since they are not familiar with the social model, there is no reason to believe that they will interact again. In this case, appropriateness and quality concerns provide potential explanations. For both strong and weak ties, modelling could occur based on quality concerns, appropriateness and affiliation. For weak ties, the case for modelling for affiliation is the strongest. Weak ties are more likely to differ from each other in their eating behavior and norms. They do not eat together as frequently as weak ties and could be unaware of the typical eating behavior of the other. This presents an opportunity to project a positive self-image and affiliate with the social model. For strong ties, the case for modelling for appropriateness is the strongest. Weak ties tend to differ from each other, at least more than strong ties. They also trust each other and value each other's opinions less (Krackhardt, 1992). Therefore, they might have different tastes or find each other's choices inappropriate (Cruwys et al., 2015). Strong ties are already strongly affiliated and are likely to be aware of each other's eating behavior. They trust each other and value each other's opinions. This takes away the need to portray a positive self-image, which could be present with a weak tie. When faced with uncertainty about what constitutes appropriate behavior, close social ties attach high value to the norm set by their tie (Granovetter, 1973). People generally evaluate meat substitutes less positively than meat (Onwezen et al., 2021). This indicates a higher likelihood of concerns regarding the quality of the dish. Berger et al. (2019) find that positive ratings from other people can raise the expected quality of meat substitutes. This is in line with the finding of Onwezen et al. (2022) that social norms are important in the acceptance of alternative proteins. Observing a social model ordering a dish containing a meat substitute can signal quality, reduce uncertainty and lead to the respondent modelling the choice. Based on these theories, the following hypotheses are created:

H3.1: Modelling of protein choice is mediated by affiliative, appropriateness and quality concerns

H3.2:Modelling for weak ties is mainly out of affiliative concerns

H3.3:Modelling for strong social ties is mainly out of appropriateness concerns

H3.4: In the modelling of a dish containing a meat substitute, quality concern plays a bigger role than in the modelling of other dishes

2.7. Meat substitutes

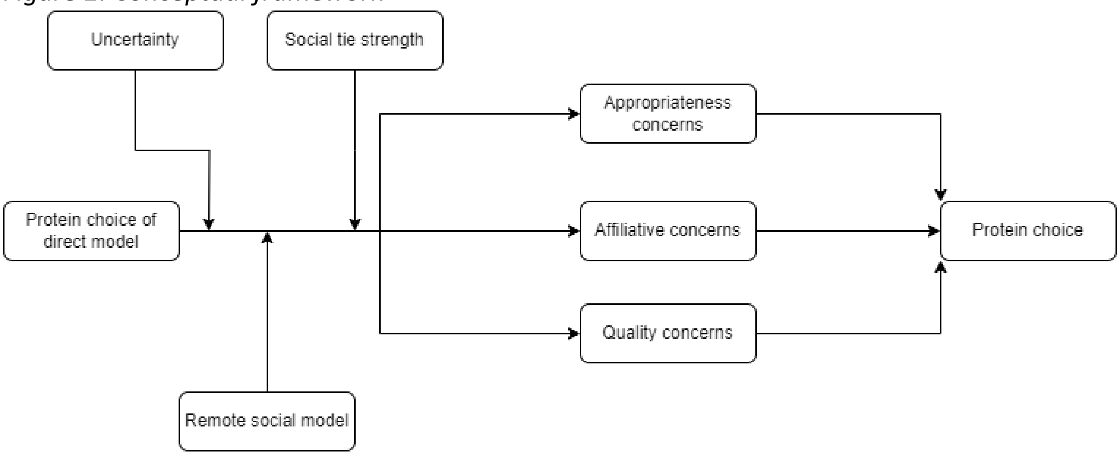
Since the barriers to reducing/substituting meat consumption are not fully removed by social norms, they might still deter people from modelling protein choices. The following barriers are mentioned most often in the literature: food neophobia, identity incongruence, habitual behavior, price, sensory aspects (texture or flavor), culture, convenience, (un)availability and unfamiliarity (Carlsson et al., 2022; Hielkema & Lund, 2021; Hoek et al., 2011; Onwezen et al., 2021). Offering people the option of a meat substitute reduces some of these barriers. Meat substitutes are similar to meat in texture and flavor. This means that meat substitutes can fill the same role as meat in a dish. The dish is, therefore, more similar to the traditional meat dish. This reduces the effects of sensory aspects, unfamiliarity and unavailability. For consumers who have experience with meat substitutes, it also reduces the effects of food neophobia. Since there are fewer barriers to overcome when modelling the choice of a meat substitute, the following hypothesis is made:

H4: When a social model chooses a dish containing a meat substitute, respondents will be more likely to order a dish containing a meat substitute than a vegetarian dish.

2.8. Conceptual framework

Figure 2 presents the conceptual framework of this study. It summarizes and visualizes the concepts mentioned in this chapter. It shows the hypothesized effects of the protein choice of the social model, mediated by appropriateness, affiliative and quality concerns, on the protein choice of the respondent. This is the modelling effect. Uncertainty, social tie strength and the norm set by a remote social model are hypothesized to moderate this effect. More uncertainty and a stronger social tie should cause a stronger modelling effect. The norm set by a remote social model should strengthen the modelling effect when the norms are in line. When the norm of the remote social model contradicts the norm of the direct social model, it should weaken the modelling effect.

Figure 2. Conceptual framework



3. Methodology

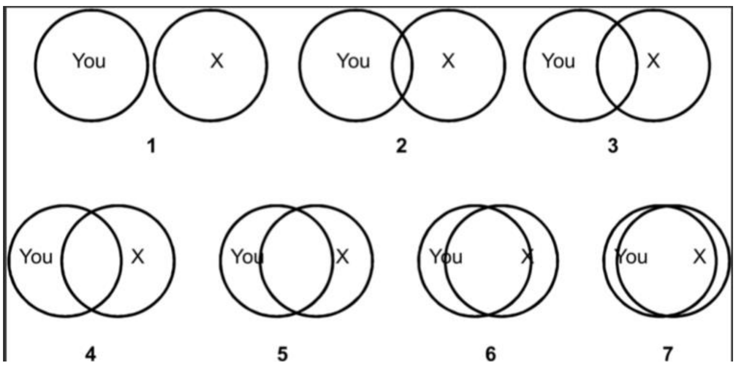
3.1. Hypothetical choice experiment

The method for data collection is a hypothetical choice experiment. A hypothetical choice experiment is a stated preference method in which participants are faced with, oftentimes multiple, hypothetical choices with two or more options. Choices are often described by certain attributes that can take different levels. For example, the attribute price can take the levels of 5, 10 or 20 euro. Respondents are asked to choose their preferred option in each choice. These choices provide data on which options are most preferred or when certain options are more preferred (Alpizar et al., 2003). In this study, the hypothetical choice is a choice between dishes containing different forms of protein. The options are the same for every respondent. However, the context of the choice is varied between subjects. This version of a hypothetical choice experiment allows an analysis of the influence of the context on the choices made by the respondents.

3.2. Design

The between-subject variation lies in the social tie and their order. The design is a 2x2 social tie vs protein choice, so four groups. Varying between weak/strong social ties and meat/meat substitute orders of the social model.

The social tie of the eating partner is varied between a close friend (strong) and an acquaintance (weak). The respondent is asked to give a name fitting a description in order to ensure they read the question and to increase immersion in the situation. The following description is used for the strong social tie: “First, we would like to ask you to think of someone that fits the description of being a close friend without specific dietary restraints. Please think of someone that you interact with multiple times a week, you trust and have a deep connection with. To help you out, please imagine someone that would score a six on the closeness scale below.”. For the weak social tie, this description is used: “ First, we would like to ask you to think of someone that fits the description of being an acquaintance without specific dietary restraints. Please think of someone you interact with somewhat regularly. You like this person, but do not have a close relationship with them. To help you out, please imagine someone that would score a 2 on the closeness scale below.”.



(Gächter et al., 2015)

For both the weak and strong social ties, there is a group in which the model orders only meat dishes and a group in which the model orders only meat substitute dishes. This leads to the groups shown in Table 2.

Table 2. Experimental design

Social ties:	Meat Order	Meat substitute order
Strong social tie	Group 1	Group 2
Weak social tie	Group 3	Group 4

3.3. Measures

Remote norm

To answer sub-question 1, the following questions are included in the survey: “With whom do you usually eat?” (housemate(s), family, friend(s), partner, classmate(s), colleague(s), no one) and “what type of dish do they usually eat?” (meat dishes, dishes with a meat substitute, vegetarian dishes). These questions provide information regarding the models that are present in normal eating situations for the respondents. These are remote models, as they are not physically present in this study, but they could still affect the respondent’s protein choice. In the analysis, it is tested whether the remote model has an effect on protein choice and if it matters whether the norm set by the distant model is in line with the norm of the direct model or contradicts it.

Drivers

Based on the theory, three potential drivers for modelling are identified. Affiliation, appropriateness and quality concern. In order to test if and when these drivers affect the modelling process, the respondents are asked to what extent they agree with the following three statements on a 1-7 scale. “ the menu I selected allows me to connect with (social tie)”, “the menu I selected is appropriate” and “the menu I selected will not disappoint”. In the analysis, it is tested whether modelling affected these drivers and, if yes, when. This allows sub-question 4 to be answered.

Uncertainty

To test the effect of uncertainty on the modelling process, a question regarding familiarity with the dishes is included. The respondents are asked to indicate how familiar they are with the dishes mentioned in the experiment on a 7-point scale. If respondents are unfamiliar with the dishes, this creates a higher degree of uncertainty, and their preferences are less developed. When respondents are very familiar with the dishes, they will have strong preferences of their own and will be less uncertain. Therefore, they might be influenced less by the order of the model.

Diet

For the analysis, some information regarding the diet of the respondents is required. The respondents are asked to indicate what diet they consider themselves to follow. This allows separation between respondents who do and do not eat meat. Next, they are asked why they follow this diet. The respondents who eat meat are asked how often they eat meat. Theory indicates that this could affect protein choice.

Demographics

At the end of the survey, the respondents are asked to give some general demographic information to get an overview of the sample. The respondents are asked to indicate what their gender is, how old they are, what their main occupation is, what the highest education they achieved is and what their nationality is.

Some other variables are created based on the data from the survey. These variables are used to better analyze the data. Table 3 lists these variables and explains what they measure.

Table 3. Created variables

Variable	Measure
Order1-4	Indicates the dish the respondent chooses for each choice. Order1, 3 and 4 are coded as 1 = Meat option, 2 = Meat substitute option, 3 = Vegetarian option. For Order2, 1= Chinese tomato soup, 2= Chicken soup and 3= Vegetable soup.
Protein1, Protein3, Protein4	Indicates whether the respondent chooses a meat option or a non-meat option for choices 1, 3 and 4. 0 = non-meat option (this includes meat substitute and vegetarian options) and 1 = meat option.
Model1-4	Indicates whether the respondent chooses the same dish as the social model or not for each choice. 1= the same choice (modelling) and 0 = a different choice (no modelling).
ModelIndex	Indicates how often respondents modelled the choice of the social model. This variable is a summation of Model1, Model3 and Model4. Scores range from 0 (modelled 0 choices) to 3 (modelled all 3 choices).
MeatModel	Indicates whether the social model linked to the respondent ordered meat or a meat substitute. 1 = social model ordered meat, 0 = social model ordered meat substitute.
Tie	Indicates whether the social tie between the respondent and the social model is strong or weak. 1= a strong social tie and 0 = a weak social tie.
Group	Is a combination of MeatModel and Tie. This summarizes which condition the respondent is exposed to. 1 = Strong social tie who orders meat, 2= Strong social tie who orders meat substitute, 3= Weak social tie who orders meat and 4= Weak social tie who orders meat substitute.
Remote Norm	Indicates what type of dish is usually eaten by the eating partners of the respondent. 1= Meat dish, 2= Meat substitute dish and 3= vegetarian dish.
RemoteNorm2	Summarizes RemoteNorm into a binary variable. Meat substitutes and vegetarian dishes are combined, similar to Protein. 0 = non meat 1= meat
InLine	Indicates if the remote norm and direct norm are in line or contradicting. 0 = contradicting norms, 1 = norms are in line.

3.4. Procedure

The following setting is described to the respondents: the respondents are asked to imagine going out to eat at a newly opened Asian restaurant near them. They are going with either a close friend (strong social tie) or an acquaintance (weak social tie) of their choice who recommended this restaurant. In this restaurant, both persons order a menu consisting of four preset dishes, of which they can choose the protein. An Asian restaurant is used because rice and noodle dishes are common in this cuisine. These types of dishes are most appropriate when using meat substitutes (Elzerman et al., 2015). The menu with preset dishes takes away the potential effect of prices and presents a realistic situation in which multiple choices are made. In the setting, it is mentioned that the social tie of the respondent recommended the new restaurant in order to simulate uncertainty for the respondent and familiarity for the social tie. The uncertainty and familiarity should increase the effects of modelling.

The choices in the menu are:

The first dish is a spring roll. The respondent can choose between:

- Chicken spring roll
- Vega chicken spring roll
- Vegetable spring roll

The next dish is a soup. The respondent can choose between:

- Chinese tomato soup
- Chicken soup
- Vegetable soup

The next dish is a pad thai. The respondent can choose between:

- Chicken pad thai
- Vega chicken pad thai
- Vegetable pad thai

The pad thai is a rice noodle stir fry including mixed vegetables, spices and a sauce.

The last dish is a curry. The respondent can choose between:

- Chicken curry
- Vega chicken curry
- Vegetable curry

The curry is served with rice and includes mixed vegetables, coconut milk and a green curry paste.

These choices are the same for every respondent. The options include a meat option, an option including a meat substitute and a fully vegetarian option. Every choice includes an option "none", so respondents can choose not to take a dish they do not like. The soup choice does not include the same protein options as the other dishes. This dish is included as a decoy option to increase realism.

4. Results

4.1. Data

The hypothetical choice experiment closed after 14 days on 12/06/2023 with 248 responses. From these responses, 87 were dropped due to being incomplete. All incomplete responses did not make any food choices and can, therefore, not be used. Next, two responses were dropped for not agreeing to participate after reading the privacy statement. Additionally, one response was dropped due to non-serious answers. This resulted in 158 useable observations. Of these observations, 33 indicated that they do not eat meat and were therefore dropped from the sample. The sample that is used in the analysis is 125 observations. One respondent preferred not to disclose their gender. This results in an answer category with only one observation. The sample consists mainly of Dutch students, is 67% male and has a mean age of 23. By dropping respondents who do not consume meat, more female respondents were dropped than male respondents. This also results in a slight imbalance between the groups, with group 2 having the least observations. However, group 2 still has 20% of the observations, which differs by 8% from group 1, which is the largest group. For the variables used in the analysis, the difference is less than 5%, which is not assumed to be a problem

4.2. Analysis

In this section, the hypotheses of this study are tested. For all statistical tests, an alpha of 0.05 is used. The main hypothesis of this study is:

H: Social models can influence protein choice through modelling

The results of this study give both supporting and contradicting evidence for this hypothesis.

A chi-square test of independence is performed to examine the association between the protein choice of the social model and the orders of the respondents. The results are presented in Table 4, and the frequencies are shown in Figure 3.

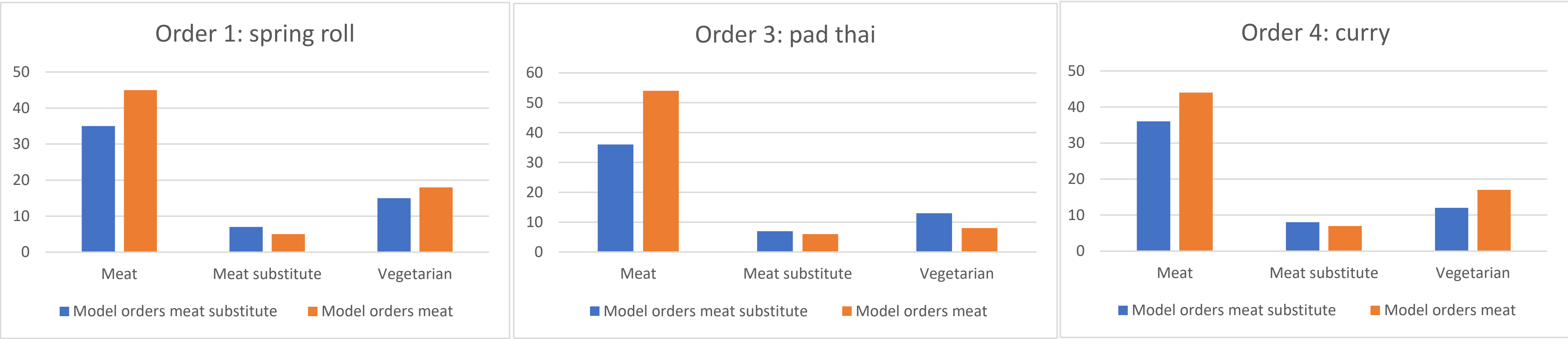
Table 4. Chi-square results protein choice model on order respondent

Variables	**Degrees of freedom**	**N**	**χ^2**	**p**
MeatModel Order 1	2	125	0.90	.64
MeatModel Order 2	2	125	3.74	.15
MeatModel Order 3	2	125	0.57	.75

†=p<.1, *p<.05, **p<.01, ***p<.001

The results of the tests indicate no significant association between the protein choice of the model and the orders of the respondents.

Figure 3. Frequencies protein choice model on order respondent



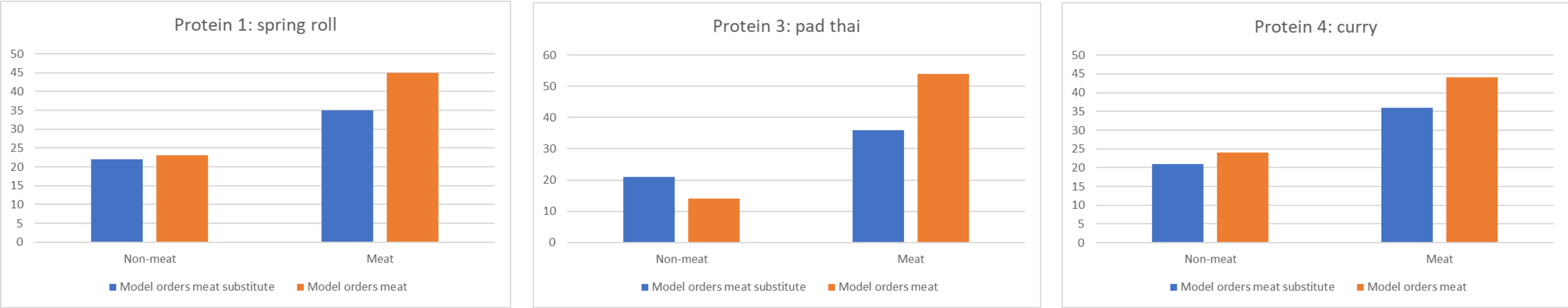
A chi-square test of independence is performed to examine the association between the protein choice of the social model and the protein choice of the respondents. The results are presented in Table 5, and the frequencies are shown in Figure 4

Table 5. Chi-square results protein choice model on protein choice respondent

Variables	**Degrees of freedom**	**N**	**χ^2**	**p**
MeatModel Protein1	2	125	0.31	.58
MeatModel Protein3	2	125	4.06	0.04*
MeatModel Protein4	2	125	0.03	.86

†=p<.1, *p<.05, **p<.01, ***p<.001

Figure 4. Frequencies protein choice of the model on protein choice of respondent



The significant result for Protein3 indicates that there is an association between the order of the model and the protein choice of the respondent for the pad thai. When the social model orders a pad thai with meat, the respondent is significantly more likely to also order a pad thai with meat. The insignificant results for the other variables do not support this finding; in these cases, there is no association between the order of the model and the order of the respondent.

Next, the following hypotheses are tested.

H1.1: The presence of a remote vegetarian eating norm will increase the likelihood of modelling vegetarian choices

H1.2: The presence of a remote vegetarian eating norm will decrease the likelihood of modelling meat choices

The tests in this study support these hypotheses.

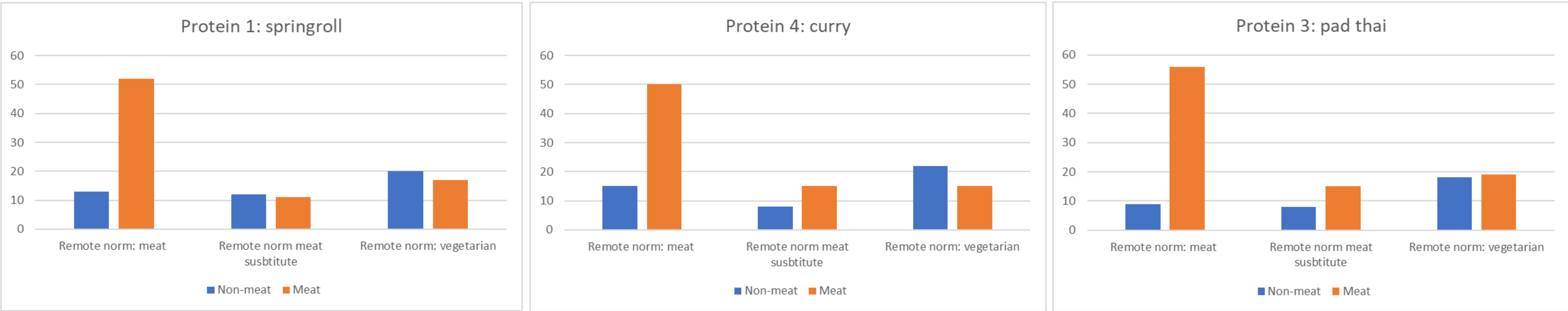
A chi-square test of independence is performed to examine the association between the type of dish people around the model usually eat and the respondent's protein choice. The results are shown in Table 6, and the frequencies are shown in Figure 5.

Table 6. Chi-square test results remote norm

Variables	**Degrees of freedom**	**N**	**χ^2**	**p**
RemoteNorm Protein1	2	125	15.07	.001**
RemoteNorm Protein3	2	125	14.81	.001**
RemoteNorm Protein4	2	125	13.56	.001**

†=p<.1, *p<.05, **p<.01, ***p<.001

Figure 5. Frequencies remote norm on protein choice of the respondent



The significant results of the tests indicate that there is an association between the type of dish people around the model usually eat and the protein choice of the model. When the respondent usually eats with people who eat meat, the respondent is significantly more likely to order a meat dish in all choices.

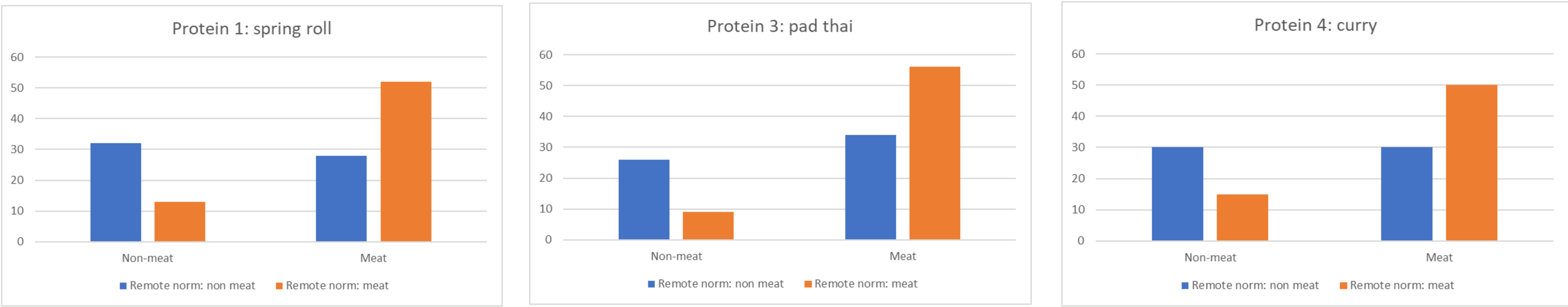
A chi-square test of independence is performed to examine the association between the protein choice of the people around the model and the respondent's protein choice. The results are shown in Table 7, and the frequencies are shown in Figure 6. In this test, the remote norm is simplified to non-meat and meat, whereas the previous test differentiated between meat dishes, meat substitute dishes and vegetarian dishes.

Table 7. Chi-square test results remote norm protein

Variables	**Degrees of freedom**	**N**	χ^2	**p**
RemoteNorm2 Protein1	2	125	15.05	<.001***
RemoteNorm2 Protein3	2	125	13.46	<0.001***
RemoteNorm2 Protein4	2	125	9.82	0.002**

†=p<.1, *p<.05, **p<.01, ***p<.001

Figure 6. Frequencies remote norm protein on protein choice of the respondents



The significant results of the tests indicate that there is an association between the protein choice of people around the model and the protein choice of the model. When the respondent usually eats with people who eat meat, the respondent is significantly more likely to order a meat dish in all choices.

To compare the effect of a remote norm being in line with the direct norm to a remote norm contradicting the direct norm, a simple linear regression is performed. How often a respondent modelled their protein choice is regressed on a binary variable indicating whether or not the remote and direct norm are in line. The result shows that respondents faced with a direct norm that is in line with their remote norm are more likely to model the direct norm than respondents who are faced with contradicting norms $t(1) = 2.77$, $p=.006$. The coefficient is 0.62, indicating that when the remote and direct norm are in line, a respondent, on average, models 0.62 choices more than when they contradict.

Next, The following hypothesis is tested.

H2.1: A stronger social tie will increase the modelling effect on protein choice

The results of this study do not support this hypothesis.

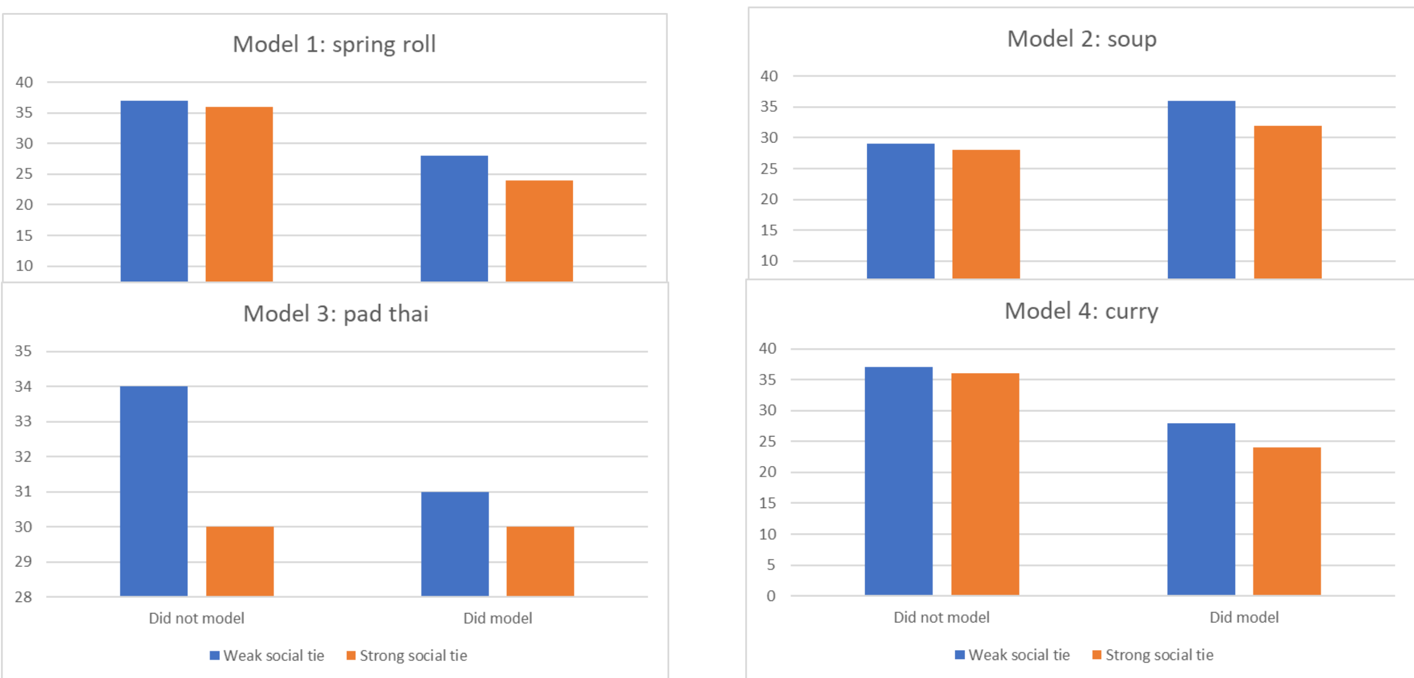
A chi-square test of independence is performed to examine the association between social tie strength and the modelling of food choices. The results are shown in Table 8, and the frequencies are shown in Figure 7.

Table 8. Chi-square test results social tie strength and modelling of food choice

Variables	**Degrees of freedom**	**N**	**χ^2**	**p**
Tie Model1	2	125	0.12	.73
Tie Model2	2	125	0.05	.82
Tie Model3	2	125	0.07	.80
Tie Model4	2	125	0.12	.73

†=p<.1, *p<.05, **p<.01, ***p<.001

Figure 7. Frequencies social tie strength on modelling of food choice



All four of the test provide insignificant results. Therefore, no evidence of an association between social tie strength and the modelling of the respondents is found.

The previous hypotheses are further tested by estimating a moderated mediation model using the Hayes PROCESS macro in SPSS. This also allows the following hypotheses to be tested (Andrew F. Hayes, 2018).

H3.1: Modelling of protein choice is mediated by affiliative, appropriateness and quality concerns

H3.2:Modelling for weak ties is mainly out of affiliative concerns

H3.3:Modelling for strong social ties is mainly out of appropriateness concerns

H3.4: In the modelling of a dish containing a meat substitute, quality concern plays a bigger role than in the modelling of other dishes

The results of this study do not find evidence supporting these hypotheses.

The Moderated mediation model described in Table 9 is estimated.

Table 9. Moderated mediation model 1

Y	X	Mediators	Moderators	Covariates	Interactions
ModelIndex	MeatModel	Affiliation	RemoteNorm2	MC	Int_1 = MeatModel x RemoteNorm2
		Appropriateness	Tie	Male (dummy)	Int_2= MeatModel x Tie
		Quality		Pref (dummy)	

Table 10, Moderated mediation model 1 outcome variable: Affiliation

Variable	***Coefficient***	***Standard error***	***t***	***p***
Constant	3.28	0.51	6.45	<.001***
MeatModel	-0.96	0.48	-2.02	.05*
RemoteNorm	-0.40	0.48	-0.82	.41
Int_1	0.13	0.59	0.23	.82
Tie	-0.11	0.44	-0.24	.82
Int_2	1.98	0.59	3.36	.01**
MC	0.30	0.16	1.89	.06†
Male	-0.44	0.33	-1.31	.19
Pref	-2.66	1.66	-1.60	.11

†=p<.1, *p<.05, **p<.01, ***p<.001

MeatModel and the interaction between MeatModel and Tie have a significant effect on Affiliation. This indicates that the order of the social model has an effect on the respondent's ability to affiliate with the social model. The significant interaction term indicates that social tie strength moderates this effect.

Table 11, Moderated mediation model 1 outcome variable: Appropriateness

Variable	***Coefficient***	***Standard error***	***t***	***p***
Constant	6.15	0.37	16.48	<.001***
MeatModel	-0.59	0.35	-1.68	.09†
RemoteNorm	-0.65	0.36	-1.83	.07†
Int_1	0.64	0.43	1.49	.14
Tie	-0.51	0.32	-1.59	.11
Int_2	0.89	0.43	2.05	.04*
MC	0.04	0.12	0.33	.74
Male	-0.03	0.24	-0.11	.91
Pref	1.90	1.22	1.56	.12

†=p<.1, *p<.05, **p<.01, ***p<.001

The interaction between MeatModel and Tie has a significant effect on Appropriateness. This indicates that social tie strength moderates the effect of the protein choice of the social model on affiliation.

Table 12, Moderated mediation model 1 outcome variable: Quality

Variable	***Coefficient***	***Standard error***	***t***	***p***
Constant	5.34	0.38	14.06	<.001***
MeatModel	-0.15	0.36	-0.43	.67
RemoteNorm	-0.36	0.36	-0.98	.33
Int_1	0.40	0.43	0.92	.36
Tie	0.06	0.33	0.18	.86
Int_2	-0.11	0.44	-0.26	.80
MC	0.10	0.12	0.88	.38
Male	0.40	0.25	1.59	.11
Pref	-1.35	1.24	-1.01	.28

†=p<.1, *p<.05, **p<.01, ***p<.001

None of the variables have a significant effect on quality.

Table 13, Moderated mediation model 1 outcome variable: ModelIndex

Variable	***Coefficient***	***Standard error***	***t***	***p***
Constant	0.09	0.60	0.16	.88
MeatModel	1.70	0.17	9.98	<.001***
Affiliation	-0.03	0.05	-0.56	.57
Appropriateness	-0.01	0.07	0.13	.90
Quality	-0.06	0.07	-0.79	.43
MC	0.19	0.08	2.38	.02*
Male	0.15	0.20	0.76	.45
Pref	-0.47	0.98	-0.48	.63

†=p<.1, *p<.05, **p<.01, ***p<.001

MeatModel and covariate MC have a significant effect on ModelIndex. MeatModel has a positive effect on how often a respondent modelled the protein choice of the model. This indicates that a respondent is more likely to model when the social model ordered a meat dish. Meat consumption also has a positive effect on how often a respondent modelled protein choice. This indicates that a respondent who eats more meat is more likely to model protein choice.

Next, model 2 is estimated. This is the same model as model 1 but using the protein choice for the pad thai as dependent variable instead of the indicator of how often respondents modelled. By only changing the dependent variable, the first three steps are exactly the same as in model 1. This provides the same output as Tables 10, 11 and 12. Table 14 describes model 2, and Table 15 shows the effects on the dependent variable.

Table 14. Moderated mediation model 2

Y	X	Mediators	Moderators	Covariates	Interactions
Protein3	MeatModel	Affiliation	RemoteNorm2	MC	Int_1 = MeatModel x RemoteNorm2
		Appropriateness	Tie	Male (dummy)	Int_2= MeatModel x Tie
		Quality		Pref (dummy)	

Table 15. Moderated mediation model 2 outcome variable: Protein3

Variable	*Coefficient*	*Standard error*	*t*	*p*
Constant	-2.48	1.78	-1.39	.16
MeatModel	0.90	0.48	1.88	.06†
Affiliation	-0.12	0.14	-0.84	.40
Appropriateness	-0.22	0.22	-1.00	.32
Quality	0.32	0.20	1.61	.11
MC	0.97	0.24	4.01	<.001***
Male	0.30	0.51	0.60	.55
Pref	-13.21	736.16	-0.02	.99

†=p<.1, *p<.05, **p<.01, ***p<.001

Only MC has a significant effect on the protein choice for the pad thai. Meat consumption has a positive effect, indicating that a respondent who consumes more meat is more likely to order this dish with meat.

Lastly, the following model is estimated.

Table 16. Moderated mediation model 3

Y	X	Mediators	Moderators	Covariates	Interactions
ModelIndex	MeatModel	Affiliation	RemoteNorm2	MC	Int_1 = MeatModel x RemoteNorm2
		Appropriateness	Familiarity	Male (dummy)	Int_2= MeatModel x Familiarity
		Quality		Pref (dummy)	

This model allows the following hypothesis to be tested:

H2.2: A higher degree of uncertainty will increase the modelling effect on protein choice

The results of this study do not support this hypothesis.

In the following table, the main and interaction effects of familiarity on the three mediators are displayed.

Table 17, Moderated mediation model 3 effect of familiarity

	Coefficient	***Standard error***	***T***	***p***
Familiarity on affiliation	-0.19	0.17	-1.10	.27
Int_2 on affiliation	0.29	0.23	1.27	.21
Familiarity on appropriateness	-0.17	0.11	-1.48	.14
Int_2 on Appropriateness	0.19	0.15	1.22	.22
Affiliation on Quality	0.08	0.11	0.76	0.45
Int_2 on Quality	0.23	0.15	1.51	0.13

†=p<.1, *p<.05, **p<.01, ***p<.001

No significant results indicate that familiarity has no direct or interaction effect on Familiarity, Appropriateness or Quality.

The last hypothesis of this study is:

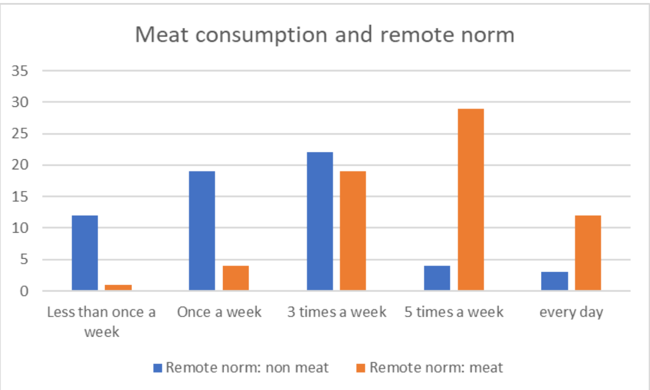
H4: When a social model chooses a dish containing a meat substitute, respondents will be more likely to order a dish containing a meat substitute than a vegetarian dish.

This hypothesis is not supported by the evidence of this study.

Table 4 shows that there is no evidence that a model ordering a meat substitute increases the likelihood of a respondent ordering a meat substitute.

Both in moderated mediation models 1 and 2, meat consumption has a significant effect on the dependent variable. This indicates that meat consumption plays an important role in protein choice and could have an effect on the modelling process. In order to test if there is an association between meat consumption and the remote norm of a respondent, a chi-square test is performed. The association between these variables was significant, χ^2 (4, N = 125) = 43.52, p <.001. When the respondent usually eats with people who eat meat, the respondent is significantly more likely to eat more meat. The frequencies are shown in Figure 8.

Figure 8. Frequencies of meat consumption on remote norm



5. General Discussion

The aim of this study was to test the effect of different social models on protein choice. The literature has provided some evidence of modelling effects on protein choice (Christie & Chen, 2018; Einhorn, 2020). The results of the current study do not fully align with the current literature. A hypothetical choice experiment asked respondents to make three protein choices. The respondents were exposed to different types of models. Additional measures for potential mediators and moderators were included. Some evidence for modelling was found; in one out of three choices, there is an association between the protein choice of the social model and the protein choice of the respondent. By using different types of models, potential mediators and potential moderators, the current study has aimed to further explain the modelling process. The results and implications are further discussed.

5.1. Theoretical & practical implications

The main question of this study was how social models affect protein choice. Based on social modelling literature, it was hypothesized that respondents would be more likely to copy the protein choice of the social model. The results of this study provide some mixed results. When analyzing how often a respondent modelled the choice of the social model, the results suggest that the protein choice of the model has a significant effect. However, modelling only seems to take place in the case where the social model ordered a meat dish. To test whether respondents exposed to a model who ordered meat were indeed more likely to order meat than the respondents exposed to a model who ordered a non-meat dish, the actual protein choice was analyzed. In the case of the pad thai, the chi-square test indicates an association between the order of the social model and the protein choice of the respondents. Respondents exposed to a social model ordering a meat dish were significantly more likely to order meat than respondents who were exposed to a social model ordering a meat substitute. However, in moderated mediation model 2, this effect was only marginally significant. Additionally, the protein choices for the spring roll and curry were not affected by the protein choice of the social model. These findings are quite different to the literature. In general, modelling is a robust phenomenon that consistently takes place (Cruwys et al., 2015; Vartanian et al., 2015). Modelling of protein choice is studied less, but the studies that are done do find strong evidence for modelling (Christie & Chen, 2018; Einhorn, 2020;). The results of the current study are more in line with Garcia et al. (2021) and Pliner & Mann (2004). These studies find modelling effects in certain cases but not in others. Pliner & Mann (2004) find no evidence of modelling when studying food that is considered unpalatable. This is unlikely to play a large role in the current study, as only 8% of the respondents reported not liking the dishes mentioned in the experiment. Garcia et al. (2021) suggest that some food categories could be more susceptible to modelling than others. They find more evidence for modelling in starters than in desserts. In this study, no modelling is observed for the spring roll, which is considered a starter dish. The evidence of this study suggests that perhaps the specific dish, and not the category, could affect modelling. This study includes two main dishes, one of which is modelled significantly more than the other. The dishes are quite similar but include some different ingredients. Elzerman et al. (2011, 2015) report that meat substitutes are more appropriate in some dishes than in others. The dishes used in the experiment were chosen to be appropriate for meat substitutes. However, it could be the case that respondents found the curry and spring roll to be inappropriate without meat and the pad thai not. It is also possible that respondents are less familiar with the pad thai. This could cause uncertainty which may lead to modelling. Familiarity is only measured for all the dishes together and not separately in this study, so this was not tested. An important difference from the other modelling studies mentioned is that the current study uses a hypothetical scenario instead of a real-life scenario. The potential implications of this are discussed under limitations. By using this different methodology, the current study adds to the understanding of modelling and how to study it. The lack of significant modelling effects is a large difference with the literature and could be due to the use of a hypothetical scenario.

Remote models can take many different forms and are present in many situations. In the literature, they are generally studied in isolation. However, in real scenarios, they can be present together with a direct norm. Therefore the first sub-question was how a remote norm affects the modelling process. Based on literature regarding conflicting norms, it was hypothesized that a norm set by a remote model will reduce modelling when it conflicts with the direct model's norm and will increase modelling when it is in line with the norm set by the direct model (Roth et al., 2001). The results of this study show that the remote norm had a strong effect on the protein choice of the respondents. Respondents who are used to eating with people who often eat meat dishes were more likely to order meat dishes. In the same way, respondents who are used to eating with people who often eat vegetarian dishes were more likely to order a vegetarian dish. This shows a direct effect of remote models on protein choice. In the literature, remote norms have been shown to induce modelling (Cruwys et al., 2015; Vartanian et al., 2015). Remote models have been included in different forms in previous studies. Romero et al. (2009) used a video of a confederate consuming a large amount or a small amount of food, Prinsen et al. (2013) used empty food wrappers, and Roth et al. (2001) used cultural expectations. The form in which a remote norm is used can impact the effects it has. Specifically for protein choice, only Einhorn (2020) included a remote model in the form of an informational poster. She did not find this to significantly influence protein choice. The current study is the first to provide evidence of remote models influencing protein choice. It is also the first study using regular eating partners as a remote model. A regression of how often a respondent models on a variable indicating whether their remote norm is in line with the direct norm of the experiment was performed. The result shows that when the remote and direct model present the same norm, modelling was more likely to occur than when the remote and direct norm are contradictory. These results confirm the hypotheses in this study. However, the chi-square test between the remote norm the respondents are usually exposed to and meat consumption indicates that they are associated. Respondents who usually eat with people who eat meat dishes generally eat more meat than respondents who usually eat with people who eat non-meat dishes. This indicates that it is likely that respondents usually eat the same dishes as the people they eat with. This makes sense if people cook together. It is then the question whether it is the remote norm of eating meat or the diet of the respondent that influences protein choice. The literature states that meat consumption is a highly habitual behavior (Rees et al., 2018; Zur & A. Klöckner, 2014). It is possible that the norms of people with whom a person usually eats become habits over time. Overall, the current study provides new information regarding the effects of remote norms on the modelling process.

The second sub-question relates to the effect of the social tie between the social model and the respondent. Social norm literature suggests that the source of a social norm affects the effect of that norm (de Castro, 1994; Pachucki et al., 2011; Sharps et al., 2021; Vandermoere et al., 2019). Social tie literature differentiates between strong and weak social ties. In the social modelling literature, there is no research regarding the effect of social tie strength on modelling. In this study, it was hypothesized that a stronger social tie will increase the effects of modelling. The results of this study do not provide evidence for this effect. Uncertainty has been shown to increase the effect of social norms on behavior (Christie & Chen, 2018; Robinson et al., 2013). In the social tie literature, it is stated that uncertainty causes people to look to strong social ties for normative information (Krackhardt, 1992). It was therefore hypothesized that uncertainty increases the effects of protein choice modelling. The results of this study do not support this hypothesis. It cannot be concluded that social tie strength or uncertainty moderates the modelling process. This contradicts Higgs (2015), who states that uncertainty will increase norm following and the literature that suggests that closer norm sources lead to stronger effects of norms (de Castro, 1994; Pachucki et al., 2011; Sharps et al., 2021; Vandermoere et al., 2019). The lack of evidence for moderation could be impacted by the fact that the main effect, the effect of protein choice of the social model on the protein choice of the respondent, is quite small. This effect is only marginally significant for one out of three dishes in this study when using a moderated mediation model. In order to conclude that social tie strength and uncertainty moderate this effect, the effect needs to be present in the first place.

What are the main drivers of the modelling of protein choice is the third sub-question. In the social modelling literature, three potential drivers for modelling are identified. Affiliation, appropriateness and quality concerns are thought to be the main drivers behind modelling (Bikhchandani et al., 1998; Christie & Chen, 2018; Herman & Polivy, 2005; Higgs & Thomas, 2016; Robinson et al., 2013). It was hypothesized that these drivers mediate the modelling effect. The results of models 1 and 2 provide no evidence for this mediation. It can, therefore, not be concluded that affiliation, appropriateness and quality concerns mediate the modelling process. This does not confirm the hypotheses from the literature. However, there are currently no studies able to fully prove these hypotheses (Cruwys et al., 2015). Modelling appears to be a subconscious process; this makes it hard to test what drives it and what affects it. The mediators suffer from the same problem as the moderators; the main modelling effect in the current study is not very pronounced. It is, therefore, difficult to measure if this effect is mediated. The fact that no mediation effect was found makes it difficult to test hypotheses H.3.2 – H.3.4. However, the measures in this study can provide a starting point for other studies on how to test drivers of modelling.

The last sub-question was how the protein choice of the social model affects the modelling process. Meat substitutes have not been included in modelling studies to date. Meat substitutes are designed to mimic meat in order to help consumers reduce their meat consumption. They remove some barriers related to decreasing meat consumption (Onwezen et al., 2021). It was hypothesized that respondents are more likely to order a dish containing a meat substitute than another vegetarian dish when the social model orders a dish containing a meat substitute. The results of this study do not support this hypothesis. It cannot be concluded that meat substitutes are more likely to be modelled than other vegetarian dishes. In the current study, dishes containing a meat substitute were the least chosen category across all choices. Although the dishes were designed to fit the criteria set by Elzerman et al. (2011, 2015), the respondents may have perceived the dishes as inappropriate for meat substitutes. It is also possible that the respondents did not think the meat substitute described was appealing, making it a potentially unpalatable food. Pliner & Mann (2004) report that people may not model unpalatable food. Onwezen et al. (2021) identify unfamiliarity as a consistent barrier to acceptance of meat substitutes. Only familiarity with the dishes as a whole was measured; it is possible that the sample was unfamiliar with the type of meat substitutes described in the experiment. The current study adds to the literature by studying the modelling process of meat substitutes. The results suggest that meat substitutes are less likely to be modelled.

5.2. limitations

The hypothetical set-up of the experiment makes it possible to design the experiment in a way that matches the theory. Additionally, it allows easy distribution of the survey, which leads to larger sample sizes in a shorter time frame than other methodologies. However, it also comes with some limitations that are important to understand when interpreting the results of this research. The main limitation of a hypothetical choice experiment is that it collects stated preferences and not revealed preferences. Although the experiment is designed in a way to closely mimic a real scenario and to immerse the respondent as much as possible, it will never be the same as a real-life scenario. This can cause multiple effects, such as disinterest in the experiment or socially preferred answers. In this research, in particular, it might have a bigger limitation. The modelling of food choices is something that mostly happens subconsciously, and how or why this happens is uncertain (Christie & Chen, 2018; Garcia et al., 2021). It is, therefore, questionable whether this effect will be present to the same extent in a hypothetical scenario where no real behavior is observed. Instead of a real choice made by a social tie, this person and their choice are described. It might be that this is not similar enough to cause modelling. In a hypothetical scenario, certain aspects of social norms might not fully translate. Social sanctions related to inappropriate behavior or the benefit of affiliating with someone are not fully present. It is also possible that respondents did not read carefully enough or take the time to consider the scenario fully. If this methodology still causes modelling, the effect might be smaller for these reasons. This means that a larger sample size is required to detect it. This could be a reason for the limited amount of significant results.

An additional limitation is linked to the sample. The survey was distributed mainly among students from Wageningen University & Research (WUR). This means that the sample is not representative of the general population. Students generally are young and highly educated. WUR is specialized in themes relating to environmental issues and the agri-food sector. This may cause the sample to be more environmentally conscious and aware of their food choices and the impact they have. This can cause stronger preferences and more conscious choices, which can reduce the effects of modelling (Cruwys et al., 2015). The sample also includes considerably more males (84) than females (40). There are some studies that report modelling effects to be weaker among men. However, this evidence is inconclusive (Cruwys et al., 2015). Additionally, a larger sample size is preferred. A high number of incomplete responses caused the sample size to be smaller than expected, which reduced the power. A power of 0.8 would be preferred. Fritz and MacKinnon (2007) have created a table to estimate the required sample sizes to achieve a power of 0.8 for different types of mediation analysis. Assuming between medium and small effect sizes, a sample size of 162 is required to achieve a power of 0.8 using PROCESS. Due to the incomplete responses, this sample size was not achieved, leading to a lower power than preferred. As mentioned, there are no prior studies using a hypothetical choice experiment to study modelling. It is, therefore, difficult to estimate effect sizes. It could be that effect sizes are even smaller than expected, leading to lower power.

Hypotheses 2.1/2.2 could potentially suffer based on the setting of the study. Ariely & Levav (2000) report that people have a tendency to seek variety when eating and/or drinking with a familiar group. All respondents are in a setting with a familiar person. This could cause the opposite of modelling due to the variety seeking in groups. The findings of Ariely & Levav (2020) are based on real-life scenarios. However, it remains possible that this effect is present in a hypothetical scenario. Additionally, some people might be used to ordering different dishes and sharing them. This could especially be true for strong social ties who regularly eat together. However, since the experiment is hypothetical, there is no opportunity to discuss this; this effect is assumed to be minimal. Seeking variety from the one choice made by their social tie is assumed to be outweighed by the modelling effect.

5.3. Future research

In future research, the limitations caused by the methodology can be worked around by performing a field experiment using actual choices in a real-life setting. This provides revealed preference data, which can be compared to the results of this study. This can give insight into the differences in modelling in a hypothetical and real-life setting. This study could be designed similarly to Christie & Chen (2018) while including meat substitutes and social tie data. It could be interesting to include a measure for in vs out groups as well. This has been shown to be important in the social norm literature but has not been tested in modelling studies. In designing this study, it is important to find an appropriate location. A pretest should be performed to test whether the choices of social models are observed, the distribution of orders is appropriate, and enough respondents are available and willing to participate.

Additionally, different types of models can be tested and compared. For example, someone who is visible before or during ordering who is eating and enjoying a certain dish. This could take away appropriateness and quality concerns. Studying remote models further could also provide valuable insights. The findings of this study are promising but should be tested in a real-life setting as well. Remote models are easier to manipulate and less costly to use. If certain remote models can induce the modelling of protein choice, they could be very helpful in the protein transition. These remote models should be highly visible in order to be properly tested. Examples of remote models can be taken from the literature; informational posters (Einhorn, 2020), empty wrappers or scarps of food (Prinsen et al., 2013) and videos of people ordering or eating (Romero et al., 2009) could be compared against one another. It is important to keep potential direct models in mind. The results of the current study show that the interaction between a direct norm and a remote norm could be relevant.

In this study, and the literature in general, it remains unclear what drives people to model food choices. The drivers from the literature that are tested in this study should be tested multiple times. Finding the cause of modelling protein choices is important knowledge and can be used to further the protein transition. Perhaps a more qualitative approach can provide insight into the decision-making process linked to protein choice. This would require a few respondents who are in a situation where they are able to model food choices regularly. It would be interesting to test if this process differs based on meat consumption. In general, meat lovers have been hard to influence in their protein choice. Comparing them to flexitarians and vegetarians could provide valuable results.

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