

**The Effect of Different Types of Dynamic Norm Messages on Animal Product  
Consumption and the Mediating role of Motivation**

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## Abstract

The consumption of animal products has a large impact on the environment and lowering this consumption is an effective way to mitigate the effect of climate change. The use of dynamic norms has been found to be effective to change behavior in many studies, also in the context of pro-environmental behavior change. Therefore, this research investigates the effect of different types of dynamic norm messages on intentions to change behavior. We compare the effect of summarized group information norm messages and institutional norms messages. Also, we investigate if intrinsic and extrinsic motivation mediate the effect of the norm cues on intentions to change the consumption of animal products. We hypothesized a difference between the two norm messages and the control condition (H1) and a difference in effect between the two norm messages on intentions (H2a and H2b). For motivation, we hypothesized that the institutional norm message could lead to relatively higher extrinsic motivation than the group behavior norm message (H3). Conversely, the group behavior norm message could lead to relatively higher intrinsic motivation than the institutional signal (H4). Lastly, we hypothesized that extrinsic motivation may be less effective to change intentions than intrinsic motivation (H5). We conducted a between-subjects experimental study with random assignment of participants ( $N = 159$ ) to the two conditions and a control condition. The effect of the norm messages on intentions as well as the mediation effects were not significant. So, the results do not support our theory that dynamic summarized group information norm messages and institutional norm messages influence intentions to consume less animal products. We concluded that more research is needed to make accurate conclusions about the theory. Recommendations for future research as well as theoretical and practical implications are discussed.

*Keywords:* dynamic norms, institutional norm messages, summarized group information norm messages, sustainable diet, environment

## **The Effect of Different Types of Dynamic Norm Messages on Animal Product Consumption and the mediating role of motivation**

The consumption of animal products has a large impact on the environment. The production of animal products is responsible for 14% to 18% of the global emission of greenhouse gasses, which contributes to global warming (Gerber et al., 2013). The sector is also responsible for deforestation, loss of biodiversity, soil degradation, and air and water pollution (Steinfeld et al., 2006). By choosing more environmentally sustainable options like eating less red meat and eating more vegan products, people can mitigate the impact of climate change by 50% by 2050 (Kwasny et al., 2022). Some scientists say that avoiding meat and dairy products is the best way to reduce people's impact on the planet. (Carrington, 2018). So, behavioral change is needed. When people start to eat less animal products, the impact on the environment can be mitigated.

Social norms are standards that describe typical and desirable behavior of a group (Tankard & Paluck, 2016). There is a lot of research about how social norms can promote behavior change. They differ in the type of social norm and the type of behavior that the researchers want to change (e.g., Cheng et al., 2020; Huber et al., 2018; Sparkman & Walton, 2017). Researchers have investigated how social norms can promote environmentally sustainable behavior change and specifically eating less meat (e.g., Aldoh et al., 2021; Graca et al., 2020; Loschelder et al., 2019; Sparkman & Walton, 2017). There are multiple articles about the impact of institutional norm messages (describing behavior prescribed by institutions) and summarized group information norm messages (describing behavior of a reference group) on promoting behavior change, also about promoting reduction in meat consumption (see: Aldoh et al., 2021; Constantino et al., 2021; Nyborg & Rege, 2003; Sparkman & Walton, 2019). But the results are diffuse and the effects of the two norms have rarely been compared. There is also not a lot of research about the role of social norms in

people changing their behavior to being vegan, which involves not consuming any animal products at all.

The aim of this study is to investigate the effects of two different kinds of social norm messages on intentions about animal product consumption. We also look at the possible mediating role of feeling motivated by the norm messages on changing behavior to eating fewer animal products.

### **Summarized group information norms**

Social norm information directs people's behavior. They conform to information about the behavior and attitudes of others (Sparkman & Walton, 2017). A distinction can be made between descriptive and injunctive norms, with descriptive norms referring to perceptions of the prevalence of a behavior in a group and injunctive norms referring to the group's approval of the behavior (Cialdini & Jacobson, 2021). Here, we mostly talk about descriptive norms, because we provide information about the behavior of group members. Tankard and Paluck (2016) propose that influencing people's perception of norms could create behavior change. Norm change interventions change people's perception of others' behavior by providing norms, for instance by providing summary information about a group. Summary information means providing information about the behavior of a reference group. This can change people's perceptions of social norms and therefore change their behavior. Goldstein et al. (2008) found that providing information about a norm about other people's behavior was a better way to change behavior than providing information stressing the environmental benefits.

Sparkman and Walton (2017) used summarized group information norm messages to change participant's perceptions to motivate them to eat less meat. They used dynamic norms to inform the participants about the reduction of meat consumption of the people around them. With dynamic norms, the information is about how other people's behavior is changing.

The researchers used this type of norm to motivate behavior that is not the norm but increasing in prevalence. They make the increase salient to encourage people to conform to change. Mortensen et al. (2019) found that people conform more to these trending minority norms than a minority norm alone, because communicating that only a minority engages in a desirable behavior does not encourage conformity. Sparkman and Walton (2017) found that dynamic norms make people believe that the change will continue, and that the changing norm will be the norm in the future. Making the changing norm salient made people conform to this norm. It increased interest in eating less meat and affected actual meat consumption. The studies of Loschelder et al. (2019) and Sparkman et al. (2020) found evidence for dynamic summarized group information norm messages affecting different types of environmentally sustainable behavior, including eating less meat. In other studies by Sparkman and Walton (2019) and Cheng et al. (2020), the researchers also found evidence for dynamic summarized group information norm messages promoting behavior change for other behaviors that are not related to environmentally sustainable behavior.

Although many studies did find a significant effect for dynamic summarized group information norm cues influencing behavior change, other studies did not. Aldoh et al. (2021) replicated the study of Sparkman and Walton (2017) and measured intentions instead of only interest in eating less meat. Although previous studies found support for dynamic norms influencing behavior change, this research did not find evidence for this effect. Chalasni et al. (2021) found no effect for dynamic summarized group information norm messages on environmentally sustainable behavior change and Ek and Söderberg (2021) found no difference in dynamic norm feedback or static norm feedback, with static norm feedback meaning the current state of a norm. In conclusion, the evidence for dynamic summarized group information norm messages affecting different types of (pro-environmental) behavior is mixed.

## **Institutional norms**

Tankard and Paluck (2016) wrote that norm change interventions can also use institutions as a source of norm change cues. Changing individuals' perceptions by making institutional norms salient could lead to behavior change. An institution's decisions make clear which behaviors are desirable in a group. This could change perceptions of norms, which could lead to behavior change. However, there is not a lot of empirical evidence for this change in perceptions according to the researchers. Constantino et al. (2021) also stated that there is little empirical evidence for institutional norm messages changing norm perception, except for two studies. First, a study of Nyborg and Rege (2003) which looked at the introduction of a new smoking law in Norway. They found that after the introduction of the law, both perceptions of the social norm as well as behavior changed. Second, a study of Tankard and Paluck (2017) found that the U.S. Supreme Court ruling in favor of same-sex marriage changed people's perception of social norms toward increased support for gay marriage and gay people. This provides evidence that institutional norm messages can change perceptions, which have been shown to guide behavior according to the researchers. Eisner et al. (2020) found that informing participants about a new law changed their perception of societal norms.

Constantino et al. (2021) did not find evidence for institutional norm messages promoting behavior change in their own study, but they did find that institutional signals influenced perceptions of social norms about climate action and influenced intended pro-environmental behavior. The researchers suggest that this may be insufficient to drive behavior change, especially when it involves personal costs. Graca et al. (2020) have some concerns that policies that reduce meat consumption will lead to resistance because people may feel obligated to eat different from what they want. This may cause people to do the opposite of what is prescribed by the policies and therefore may not reduce people's



consumption of meat. If this theory is true, policies will not be effective to lower meat consumption. However, this theory needs to be further investigated. Huber et al. (2018) researched the effect of both summarized group information norm messages and government policies on carbon offsetting. They found that using only group information norm messages had little effect, but a combination of these two norm cues was very effective for behavior change. So institutional norm cues can promote environmentally sustainable behavior when group information norm cues alone are not very effective.

In conclusion, there is some evidence that institutional norm messages can lead to a change in perceptions of social norms. It is possible that this will lead to behavior change because changing perceptions have been effective in changing behavior in many studies. Also, there is one study that did not find evidence for institutional norm messages changing behavior but did find that institutional norm messages influence intentions to change behavior.

### **Present study**

In this research, we compare institutional norm messages and summarized group information norm messages to investigate which one has a stronger influence on intentions to change behavior. We use dynamic norms to communicate change in social norms and investigate how communicating these two dynamic norms influence intentions to reduce consumption of animal products. The use of dynamic norms has been effective to change behavior in multiple studies (Loschelder et al., 2019; Sparkman & Walton, 2017; Sparkman et al., 2020) and could be effective in our study because veganism is not the current norm but increasing in prevalence.

For summarized group information norm messages, there is a lot of evidence that these messages influence (pro-environmental) behavior change, but also evidence that these messages are not effective to change behavior. So, the use of summarized group information

norm messages could be effective to change intentions in our study, but the evidence is mixed. For institutional norm messages, the amount of research is limited, but there is some evidence for a change in perceptions or intentions after exposing participants to an institutional signal. So, communicating institutional norm messages could be effective to change intentions in our study. Furthermore, framing institutional norm messages dynamically could be effective to influence intentions. However, little research has been done in the context of pro-environmental behavior, so it is quite unknown what the influence of institutional norm messages will be on intentions about pro-environmental behavior.

### ***Hypothesis 1***

There will be a difference between the control condition and the two norm conditions, because we expect that both norm conditions will be effective to change intentions to eating fewer animal products.

### ***Hypothesis 2***

Furthermore, we hypothesize that there will be a difference between the institutional norm message and the summarized group information norm message. However, we are not sure which norm will be more effective to change intentions, because for both norms there is evidence for and against the effectiveness.

**Hypothesis 2a.** The group information norm message will be more effective to change intentions than the institutional norm message.

**Hypothesis 2b.** The institutional signal will be more effective to change intentions than the group information norm message.<sup>1</sup>

### **Motivation**

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<sup>1</sup> We conducted an exploratory follow up survey measuring actual behavior, but we did not make any directional hypotheses about this.

As a potential explanation for the different effects of the group norm message and the institutional signal, we investigate the role of motivation. We analyze if motivation mediates the effect of the two norm messages on intentions to eat less animal products. Therefore, we research to which type of motivation both norm messages lead and if this has an influence on the intention to eat less animal products

It has been proposed there are two types of motivation: intrinsic and extrinsic. Ryan and Deci (2000) wrote “When intrinsically motivated a person is moved to act for the fun or challenge entailed rather than because of external prods, pressures, or rewards.” (p. 56). They also stated that “Extrinsic motivation is a construct that pertains whenever an activity is done in order to attain some separable outcome.” (p. 60). For instance, when a person feels pressure to do something or does something to gain a reward.

In a review from Van Der Linden (2015) and an article from Van der Werff et al. (2013), the authors stated that people stop acting pro-environmentally when the reward, which moved people to be extrinsically motivated, disappears. With intrinsic motivation, on the other hand, change is more likely to be sustained. Van der Werff et al. (2013) and Steg et al. (2016) call a specific form of intrinsic motivation ‘obligation-based intrinsic motivation’. With this type of intrinsic motivation people feel morally obligated to perform a behavior, which elicits positive feelings from doing the right thing. This type may be especially important for pro-environmental behavior, because acting pro-environmentally can be more effortful than pleasurable. In the study from Van der Werff et al. (2013) intrinsic motivation, specifically obligation-based motivation, was used as a mediator of the relation between environmental self-identity and environmental behavior. The researchers found evidence that obligation-based intrinsic motivation promoted pro-environmental behavior. Steg et al. (2016) also stress the importance of obligation-based intrinsic motivation in making people act pro-environmentally. A study of Patki (2018) found that both intrinsic and extrinsic motivation

are positively correlated with engagement in pro-environmental behavior. Bolderdijk (2012) and Asensio and Delmas (2015) found that extrinsic motivation was less effective to promote pro-environmental behavior than environmental, health or neutral information. So, intrinsic motivation, specifically obligation-based intrinsic motivation, seems to be particularly important for pro-environmental behavior. Extrinsic motivation on the other hand can also promote pro-environmental behavior if the external incentive is present, but it is possible that this type of motivation is less effective than intrinsic motivation.

The group information norm message in our study could lead to participants feeling relatively more morally obligated (intrinsic motivation) to act pro-environmentally when compared to the institutional norm message. When participants receive information about others performing pro-environmental behavior, they may believe that this is the right thing to do and may be motivated to act pro-environmentally too because this will make them feel good. This intrinsic motivation could lead to intentions to perform pro-environmental behavior. Conversely, the institutional norm in our study could make participants feel relatively more extrinsically motivated when compared to the group information norm message, because of monetary benefits of a new rule or because they feel pressured to behave differently because of a new rule. There is some evidence that extrinsic motivation can promote pro-environmental behavior. So, it is possible that the extrinsic motivation could lead to intentions to act pro-environmentally in our study.

In conclusion, we propose that both norm messages can influence intentions, but via different types of motivation.

### ***Hypothesis 3***

The institutional norm message could lead to relatively higher extrinsic motivation than the group behavior norm message.

### ***Hypothesis 4***

The group behavior norm message could lead to relatively higher intrinsic motivation than the institutional signal.

### ***Hypothesis 5***

If we find support for hypotheses 3 and 4, extrinsic motivation could possibly be less effective to change intentions about pro-environmental behavior than intrinsic motivation. So, the institutional norm message will then possibly be less effective to change intentions than the group behavior norm message.

## **Method**

### **Participants**

An a priori power analysis (using the G\*Power application) based on a One-way Analysis of Covariance (ANCOVA) test showed that 179 participants were required to achieve a medium effect size ( $f = .25$ ) and power of 0.80. In this study 253 participants participated. We excluded 13 participants who are vegan, because they already have limited their animal product consumption to eating no animal products at all. Furthermore, we excluded 81 participants with incomplete datasets, including participants who did not read the manipulation part of the study (as shown by a timer on the page recording less than one second of viewing). After excluding these participants, the sample consisted of 159 participants. All the participants were 18 years or older. Of all participants, 60.4% were in the age group of 18-35 years old, 19.5% were in the group of 36-50 years old, 15.7% were in the group of 51-64 years old and 4.4% of the participants were 65 years and older. The sample consisted of 42 men (26.4%) 116 women (73.0%) and one non-binary person (0.6%). Of all participants forty participants identified themselves as vegetarian (25.2%), 86 as meat reducers (54.1%), thirty as meat eaters (18.9%) and three participants answered 'other' (1.9%). There were 47 Dutch (29.6%), 99 German (62.3%), and 13 international/other participants (8.2%). The participants were recruited through snowball sampling to try to

achieve a broader range of age groups. The participants took part in the study voluntarily and did not receive any compensation for their participation.

### **Design and Procedure**

The present study is a between-subjects randomized experiment, containing two dependent variables, namely intentions for reducing animal products and actual animal product consumption. Furthermore, we manipulated the source of the dynamic norm messages as an independent variable. Prior to the start of the data collection, the study was approved by the Ethics Committee of the Faculty of Behavioral and Social Sciences (EC-BSS) of the University of Groningen. The data was anonymized and the participants' identities protected and their data treated with confidentiality. Before the start of the study, every participant received an informed consent form and they received a debriefing form at the conclusion of the first questionnaire. The debriefing form included the purpose of the study, the manipulations they were exposed to, as well as the deception that had been involved. The deception concerned the information added to the newspaper articles of the two experimental conditions, which we specified and changed a bit from the truth to make them more influential as well as generalized them to all EU-citizens.

Researchers sent the online questionnaire to members of their social networks using a Qualtrics link shared either via email, WhatsApp, or other social media. The data collection took place for 17 days and the survey lasted about 10 minutes. The participants were randomly assigned to one of the three experimental conditions. We asked participants for demographic data (age, gender, nationality, dietary identity) and email addresses first, before continuing to the scales measuring our variables. Then we continued by assessing the amount of animal products consumed by the participants on a weekly basis, their interest, and intent to eat less animal products. This was followed by some personality measurements. Then, our experimental part began, where the participants were asked to read through a newspaper

article, with randomized conditions. While the participants in the control group merely received basic information on how the consumption of animal products impacts the environment, those in the individual behavior condition received some extra information about how many people are currently changing their behavior, while those in the law condition learned about new political measures that were to be introduced. Following this, we assessed self-efficacy, collective efficacy, and motivational style. Finally, we assessed intention and interest in reducing animal product consumption again, followed by one question assessing the perceived likelihood of a social norm change.

### ***Introductory content***

A general information text (can be found in the Appendix) was shown to every participant, making sure that everyone has the same level of information regarding the environmental impact of animal products. The control condition received this text without the manipulation sentences afterwards, see manipulation below.

### ***Manipulation***

Moreover, we used a dynamic-norm message for both our experimental conditions, communicating either a potential norm change in individual behavior, a political adjustment, or a control condition. The message for the group behavior condition was phrased like the following: “Fortunately, recent research has shown that within the last 5 years, EU citizens have now started to make an effort to limit their animal product consumption. In recent years, already 20-30% of EU citizens have changed their behavior and begun to eat less animal products than they otherwise would.”. This message was inspired by Sparkman & Walton (2017), highlighting that people can be prompted to change to eating less animal products through dynamic norm messages. For the political condition, the norm message was formulated in the following way: “Currently, the EU parliament is discussing the application of laws implementing heightened taxes on animal products based on their individual

environmental impact. Consequently, prices of animal products such as eggs, dairy and meat would increase by at least 30% as stated by EU spokesman Jaume Duch Guillot.” The control group did not receive any dynamic norm message.

## **Materials**

The word “meat” was changed to “animal products” to adapt the original questions to our research question. All the scales and questions used were translated into German and Dutch. We did this to broaden our sample group. The full surveys can be found in the Appendix. The scales were included in the survey in the following order.<sup>2</sup>

### ***Animal product consumption***

We adapted one question from Carfora et al. (2019) to measure animal product consumption. The question states “How many servings of animal products have you eaten in the previous week?” The answer can be given on a scale from *0-21*, which stands for three meals a day for one week. Carfora et al. (2019) described one serving as being the same size as a deck of cards.<sup>3</sup>

### ***Intention***

We measured the participant’s intention to reduce their consumption of animal products before introducing our manipulation as well as after it and in the follow-up questionnaire with four items. These items were adapted from Sparkman and Walton (2017) and from Judge et al. (2022). They asked “How interested are you in eating less animal products?”, “I intend to eat less animal products”, “In the upcoming month, I will eat less animal products”, “In the foreseeable future, to what extent do you think you will make an

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<sup>2</sup> In addition to the reported measures, we measured extraversion, self-efficacy, collective efficacy and belief about impact. However, these variables are not reported and were not included in the analysis because they were not part of my focus.

<sup>3</sup> This measure was included because our aim was to measure the participant’s animal product consumption after one week and examine a potential change in behavior. This could not be conducted due to insufficient follow-up answers.



effort to eat less animal products?”. A five-point Likert scale was used (1 = Not at all, 5 = Extremely). The items showed an internal reliability of  $\alpha = 0.93$

### ***Intrinsic and extrinsic motivation***

Four items were used to measure intrinsic and extrinsic motivation. These questions were taken from Guay et al. (2000), ( $\alpha = .95$  for intrinsic motivation,  $\alpha = .86$  for extrinsic motivation). They were created by a committee of experts and were tested to be in line with the definition of motivation (Deci & Ryan, 1985; McClelland, 1985). The questions asked why people would engage in eating less animal products. One example for an intrinsic motivation answer option is “Because I would feel good when doing this activity”, using a Likert scale from 1 = strongly disagree to 5 = strongly agree). An example for an extrinsic motivation answer option is “Because I wouldn't have any choice”, using the same Likert scale from 1 = strongly disagree to 5 = strongly agree.

### ***Manipulation check***

To check whether the texts successfully manipulated perceived future social norms, we asked participants about their perceived future social norm by asking one question “In the foreseeable future, to what extent do you think that many people will make an effort to eat less animal products?” (Sparkman & Walton, 2017). This could be answered with a Likert scale ranging from 1 = not at all to 5 = extremely.

## **Results**

### **Manipulation Check**

We used an Analysis of Variance (ANOVA) including the three conditions and the manipulation check question as a dependent variable to analyze the effectiveness of our manipulation. We did not find significant differences in the manipulation check between the conditions.  $F(2, 156) = 1.63, p = 0.20, \eta_p^2 = 0.02$ . This suggests that the manipulation was not

effective. Participants did not believe that the norms about animal product consumption were changing after being exposed to the manipulation.

### **ANCOVA Assumptions**

All the ANCOVA assumptions were met. For normality, we looked at a QQ-plot and a histogram. The plots looked like they were normally distributed without a lot of skewness or kurtosis. We checked for homogeneity of regression slopes with a scatter plot with separate regression lines for the treatment groups. The regression lines were almost parallel, so this assumption seemed to be met. Also, there were no deviations from linearity, so this assumption also seemed to be met. For homogeneity of variance, we used Levene's test. The test was not significant ( $p = 0,18$ ), so the assumption was met. Because every participant was randomly assigned to one of the three conditions, the assumption of independence of observations seemed to be met.

### **ANCOVA**

In the first part of the results section, we analyze if the differences between the control condition, the group information norm message and the institutional norm message are significant.<sup>4</sup> Therefore, we used a One-way ANCOVA controlling for baseline intentions. We used an ANCOVA because this analysis has more power than a change from baseline analysis (Van Breukelen et al., 2006) We found no significant effect of the conditions on intentions to eat less animal products after controlling for baseline intentions,  $F(2, 155) = 0.17, p = 0.84, \eta_p^2 = 0.002$ . The results show little differences between the means of the control condition ( $M = 3.71, SD = 0.90, N = 48$ ), the institutional norm message ( $M = 3.63, SD = 0.98, N = 61$ ) and the group information norm message ( $M = 3.77, SD = 0.88, N = 50$ ). So, these statistics provide evidence that there is no significant difference between the three groups. This is not

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<sup>4</sup> We did not analyze the data of the follow up survey.

in line with hypothesis 1, where we did expect to find a difference between the three conditions.

### **Mediation Analyses**

Finally, we analyze the mediation effects of motivation. We used PROCESS macro model 4 by Hayes (2022) for the mediation analyses. We used dummy coding for the two conditions, with a '0' for summarized group information norm messages and a '1' for institutional norm messages. The mediation analyses were based on 5000 bootstrapped samples using bias-corrected 95% confidence intervals. For intrinsic motivation, we found a nonsignificant indirect effect of the conditions on intentions via intrinsic motivation ( $B = -0.15$ ,  $SE = 0.10$ , 95% CI [- 0.36, 0.05]) and a nonsignificant direct effect ( $B = 0.01$ ,  $SE = 0.15$ ,  $p = 0.94$ ). For extrinsic motivation, we found a nonsignificant indirect effect of the conditions on intentions via extrinsic motivation ( $B = 0.03$ ,  $SE = 0.04$ , 95% CI [- 0.03, 0.14]) and a nonsignificant direct effect ( $B = -0.17$ ,  $SE = 0.18$ ,  $p = 0.34$ ). This is not in line with hypothesis 3 and 4, where we expected that motivation could function as a mediator for the effect of the norm conditions on intentions to consume less animal products.

The effect between the conditions and intrinsic motivation was not significant ( $B = -0.24$ ,  $SE = 0.16$ ,  $p = 0.14$ , 95% CI [- 0.56, 0.08]), but we did find a significant effect between intrinsic motivation and intentions ( $B = 0.62$ ,  $SE = 0.09$ ,  $p = 0.00$ , 95% CI [0.44, 0.80]). For extrinsic motivation, both the effect between the conditions and extrinsic motivation ( $B = 0.32$ ,  $SE = 0.17$ ,  $p = 0.07$ , 95% CI [- 0.02, 0.67]) as well as the effect between extrinsic motivation and intentions ( $B = 0.11$ ,  $SE = 0.10$ ,  $p = 0.29$ , 95% CI [- 0.09, 0.30]) was not significant. This might support hypothesis 5, that extrinsic motivation is less effective to change intentions than intrinsic motivation.

### **Discussion**

In this research, we looked at the effect of dynamic institutional norm messages and dynamic summarized group information norm messages on intentions to eat less animal products. Because the use of dynamic norms has been effective in many studies and for many behaviors (Loschelder et al., 2019; Sparkman & Walton, 2017; Sparkman et al., 2020), we hypothesized that the two norm conditions would have a stronger effect on intentions compared to a control condition (H1). We also hypothesized that there would be a difference between the institutional norm message and the summarized group information norm message using two different hypotheses. With hypothesis 2a, hypothesizing that the group information norm message would be more effective to change intentions than the institutional norm message. And hypothesis 2b, hypothesizing that the institutional signal would be more effective to change intentions than the group information norm message. Furthermore, we believed that different types of motivation could mediate the influence of the norm messages on intentions. The institutional norm message could lead to relatively higher extrinsic motivation than the group behavior norm message (H3). Conversely, the group behavior norm message could lead to relatively higher intrinsic motivation than the institutional signal (H4). Lastly, we hypothesized that extrinsic motivation could possibly be less effective to change intentions than intrinsic motivation (H5).

The results showed no difference between the effects of the control condition and the two norm conditions on intentions to eat less animal products. Furthermore, there was no difference in intentions between the institutional norm message and the summarized group information norm message. This was not in line with our hypotheses H1, H2a and H2b. The mediation effect of both intrinsic and extrinsic motivation was not significant, which also does not support hypothesis H3 and H4. However, the effect between intrinsic motivation and intentions was significant and the effect between extrinsic motivation and intentions was not. This might suggest that extrinsic motivation is less effective to change intentions (H5).

## Limitations and Future Directions

One limitation of our study is that our manipulation was not effective according to the manipulation check. One explanation for this could be that the control and the two norm conditions were very similar. Most of the information was the same for all three conditions and the two manipulations only had a few extra sentences. It is possible that the conditions did not differ enough to create a difference in effect, so the norm messages may have not been convincing enough, or that providing general information about the environmental impact of animal product consumption is already useful to heighten intentions. The general information was included in all three conditions and may have influenced people's intentions in all conditions. Therefore, another limitation is that we did not have a control condition with no information to compare giving general information and not giving general information. Another limitation is that we measured intentions to change behavior instead of actual behavior change because of practical reasons. This lowers the practical implication of the results. Another point is that we are not sure if every participant read the manipulation part of our study carefully, which may also be an explanation of the nonsignificant result of our manipulation check. We used a timer to see how long every participant took reading the manipulation, but we did not determine in advance of the study how many seconds it would take to read the text carefully. Because of this reason we decided to include all participants who saw the manipulation, even those who spend a very short amount of time on the page. When participants did not read the text carefully, they were likely not influenced by the different conditions. This may be a reason why we did not find a difference between the three conditions. Another limitation is that we had too few participants in our study. We computed that we needed 179 participants and we only used data of 159 participants, so our study was slightly underpowered. It is also possible that participants already had high intentions ( $M = 3.65$  on a five-point likert scale) to reduce their animal product consumption before the

manipulation, and that we therefore did not find an effect. When intentions were high already people may not be influenced by the conditions to even higher intentions. Another possibility is that participants wanted to make a good impression and therefore pretended that they had high intentions to reduce their consumption. We also asked participants to state their email addresses<sup>5</sup>. It is possible that participants did not feel anonymous anymore because of this, which may have heightened their need to give socially desirable answers.

A strength of our study is that we used multiple questions to measure every construct. We used this for accurate measurements of the constructs. Furthermore, we used questions from other studies in our questionnaire to be sure that the questions accurately measured the construct. Another strength is that we did an experiment with random assignment of participants to the conditions. This ensures that the groups of the three conditions are as equal as possible. Finally, we used a control group to compare our manipulations with a control condition. Therefore, we could investigate if the manipulations were effective in comparison with the control.

A recommendation for future research is to pilot the norm messages before running the study and create bigger differences between the conditions and add a fourth condition. One condition with only a summarized group information norm cue, one with only an institutional norm cue, one with general information about the impact of consuming animal products and one control condition with no information. In this way every condition contains different information, which makes it possible to accurately investigate the effect of every condition on animal product consumption. In addition, it makes it possible to investigate if providing information influences animal product consumption in comparison with no information. Another recommendation is to measure actual behavior change instead of

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<sup>5</sup> We asked for email addresses for the follow up survey

intentions to change. This will heighten the practical implication of the study. In this way it is possible to investigate if behavior really changes when communicating these norm messages and apply this to real life. Another recommendation is to make sure that every participant reads the conditions carefully. For example, by using an option where participants can continue to the next question only if they have spent a specific amount of time on the manipulation page. Or by determining in advance of the research how much time is needed to read the manipulation, to be sure which participants to include or not. Future research should also pay attention to having enough participants in order to have a study that is not underpowered. To lower social desirability, future research can be made anonymous. In this way answers cannot be connected to participants, which may lower the need to make a good impression. Future research should also consider investigating motivation as a mediator. It is possible that our manipulations were not effective to cause intrinsic and extrinsic motivation, but intrinsic motivation was related to intentions in this study. Future research is needed to investigate if other manipulations lead to motivation and if extrinsic motivation is indeed less effective to change intentions than intrinsic motivation

### **Theoretical and Practical Implications**

The non-significant result in our study challenges the theory of Sparkman and Walton (2017) that dynamic summarized group information norm messages influence pro-environmental behavior change. Our study does not support the theory, but there are a lot of differences between the two studies. One difference between our study and the study of Sparkman and Walton (2017) is that they measured interest to change behavior and actual behavior change and we measured intentions to change behavior. Another difference is that their study only investigated consumption of meat and our study investigated consumption of all animal products, a rather exploratory topic. The next difference is that they had a control condition with no information, and we did not, so their conditions differed more. This may be

a reason why they did find an effect and we did not. The last difference is that our study took place in Europe and the Sparkman study took place in the United States. It is possible that the effects differ across countries. More research is needed to make accurate conclusions about if dynamic institutional and summarized group information norm messages influence animal product consumption. Therefore, researchers need to do more research in the context of consumption of all animal products, measure actual behavior change, use conditions that differ from each other and do more research in Europe to see if the results are different from results in the United States. Aldoh et al. (2021) replicated the study of Sparkman and Walton (2017) in Europe and measured intentions instead of only interest in eating less meat. This research did not find an effect for a change in intentions just like our study. This provides evidence that it could be possible that there is no effect in Europe or that the measurement of intentions does not lead to finding an effect, but more research is needed to support these statements. Constantino et al. (2021) did not find evidence for institutional signals promoting behavior change, but they did find influenced intentions to change behavior. These results are not consistent with our study, because we did not find an effect of institutional signals on intentions to change behavior. However, our study addresses other pro-environmental behavior than the study of Constantino et al. (2021). Future research could investigate if institutional norm messages lead to a change in intentions and behavior, also in the context of animal product consumption. Huber et al. (2018) found that using only group information norm messages had little effect, but a combination of summarized group information norm messages and government policies was very effective for behavior change. Our study did not find an effect for one of the norm messages, but it is possible that a combination of both will be effective. Future research is needed to support this theory.

Our results are not significant but if dynamic summarized group information norm messages and institutional norm messages do have an influence on animal product



consumption it is very useful information. Animal product consumption has a large impact on the environment and lowering the consumption is a relatively easy way to help the climate. With the right strategy many people can be encouraged to lower their consumption. So, the results of this kind of research would be useful for the government, environmental organizations or advertising agencies who want to use evidence-based strategies to change people's behavior. Therefore, it is important to do more research on the influence of summarized group information norm messages and institutional norm messages to investigate if they are effective to lower people's animal product consumption, and if so, which norm message is more effective to change consumption.

### **Conclusions**

In conclusion, the non-significant result of our study does not support the theory that summarized group information norm messages and institutional norm messages influence animal product consumption. However, there are some limitations in our study and there are a lot of differences with previous studies. So, more research is needed to make accurate conclusions. It is important to do more research on the topic of dynamic norms and animal product consumption because animal product consumption has a huge impact on the environment and using the right strategy to lower consumption could be a simple way to help the climate. Finally, researchers should consider our recommendations for future research when they want to further investigate this theory.

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## Appendix

### Misperceptions in the dietary transition

#### INFORMATION ABOUT THE RESEARCH

Version for participants

“Perceptions of sustainable dietary behaviours” EC code: PSY-2122-S-0330

Why do I receive this information?

You are cordially invited to participate in the following research study because you are over the age of 18 and an EU citizen. This study investigates your perceptions of sustainable dietary behaviours. The research will start in April 2022 and will end in June 2022. The research plan was evaluated by the Ethics Committee of Psychology (ECP) of the University of Groningen. The principal investigator of this research is Dr Madeline Judge, a researcher at the University of Groningen. Four bachelor students are also involved (Insa Oßenbrügge, Lisa Ziegler, Annick Dikkerboom and Jana Melander).

Do I have to participate in this research?

Participation in the research is voluntary. However, your consent is needed. Therefore, please read this information carefully. Ask all the questions you might have, for example because you do not understand something. Only afterwards you decide if you want to participate. If you decide not to participate, you do not need to explain why, and there will be no negative consequences for you. You have this right at all times, including after you have consented to participate in the research.

Why this research?

The purpose of this research is to examine people’s perceptions of sustainable dietary behaviors.

What do we ask of you during the research?

Before taking this survey, you will be asked to consent to participate. The first step of this research is for you to answer some demographic, dietary behaviour and personality questions. After that, you will read a short general information newspaper article about sustainable dietary behaviours. Then, you will be asked to fill in a short survey about your perceptions. This will not take longer than 10 minutes. The study includes a follow-up questionnaire, so we will ask you to provide your email (this will not be used for any other purposes). The follow-up questionnaire will not take longer than 2 minutes and will be send to you via email one week after the original study.

What are the consequences of participation?

With your participation, you are contributing to research on the psychology of sustainable behavior. The time investment is relatively low and there are no known risks of participation.



There is no monetary compensation for participating in this survey.

How will we treat your data?

You are able to withdraw from this study at any point, without negative consequences. The collected survey data is mostly quantitative (with one qualitative item) and will be analysed by a team of researchers. Within one month of sending out the follow-up surveys, all email addresses will be deleted from the datasets. You will be able to request a summary of the overall findings of the study; however, we cannot provide your individual responses after this point, since we do not collect other identifying information. Anonymised survey data may be stored on the Open Science Framework by the primary researcher after any publications of journal articles, if requested by the journal. The principal investigator is responsible for processing and correctly storing the data. It will be stored on a password-protected drive for at least five years following any publications.

What else do you need to know?

You may always ask questions about the research: now, during the research, and after the end of the research. You can do so by emailing [j.melander@student.rug.nl](mailto:j.melander@student.rug.nl).

Do you have questions/concerns about your rights as a research participant or about the conduct of the research?

You may also contact the Ethics Committee of the Faculty of Behavioural and Social Sciences of the University of Groningen: [ec-bss@rug.nl](mailto:ec-bss@rug.nl).

Do you have questions or concerns regarding the handling of your personal data?

You may also contact the University of Groningen Data Protection Officer: [privacy@rug.nl](mailto:privacy@rug.nl). As a research participant, you have the right to a copy of this research information.

## INFORMED CONSENT

“Perceptions of sustainable dietary behaviors” I have read the information about the research. I have had enough opportunity to ask questions about it. I understand what the research is about, what is being asked of me, which consequences participation can have, how my data will be handled, and what my rights as a participant are. I understand that participation in the research is voluntary. I myself choose to participate. I can stop participating at any moment. If I stop, I do not need to explain why. Stopping will have no negative consequences for me. Below I indicate what I am consenting to.

-----

Consent to participate in the research:

- Yes, I consent to participate; this consent is valid until 27-06-2022 (1)
- No, I do not consent to participate (2)

*Skip To: End of Survey If Consent to participate in the research: = No, I do not consent to participate*

---

Consent to processing my personal data:

- Yes, I consent to the processing of my personal data as mentioned in the research information. I know that until 27-06-2022 I can ask to have my data withdrawn and erased. I can also ask for this if I decide to stop participating in the research. (1)
- No, I do not consent to the processing of my personal data. (2)

*Skip To: End of Survey If Consent to processing my personal data: = No, I do not consent to the processing of my personal data.*

What gender do you identify with?

- Male (1)
- Female (2)
- Non-binary (3)
- Prefer not to say (4)

Please indicate your age group

- 18-35 (1)
- 36-50 (2)
- 51-64 (3)
- 65 and older (4)

Please state your nationality

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Please state your email address for our short follow-up questionnaire

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Which of the following best describes your diet?

- Meat eater (1)
- Meat reducer (2)
- Vegetarian (3)
- Vegan (4)
- Other (5)

Most of the questions in this questionnaire will ask you about your consumption and attitudes towards the consumption of animal products. This includes meat, fish, eggs, and dairy products (cheese, milk, yogurt, butter etc.).

How many servings of animal products have you eaten in the previous week?

0 2 4 6 8 11 13 15 17 19 21

Number of servings per week ()	
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How interested are you in eating less animal products?

- 1 Not at all (1)
- 2 Slightly (2)
- 3 Somewhat (3)
- 4 Moderately (4)
- 5 Extremely (5)

To what extent do you agree with this statement: “I intend to eat less animal products”?

- 1 Not at all (1)
- 2 Slightly (2)
- 3 Somewhat (3)
- 4 Moderately (4)
- 5 Extremely (5)

To what extent do you agree with this statement: “In the upcoming months, I will eat less animal products”?

- 1 Not at all (1)
- 2 Slightly (2)
- 3 Somewhat (3)
- 4 Moderately (4)
- 5 Extremely (5)

In the foreseeable future, to what extent do you think you will make an effort to eat less animal products?

- 1 Not at all (1)
- 2 Slightly (2)
- 3 Somewhat (3)
- 4 Moderately (4)
- 5 Extremely (5)

**Please answer the following questions about your personality.**

I am someone who has an assertive personality

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)
- 4 Agree (4)
- 5 Strongly agree (5)

I am someone who rarely feels excited or eager

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)
- 4 Agree (4)
- 5 Strongly agree (5)

I am someone who finds it hard to influence people

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)
- 4 Agree (4)
- 5 Strongly agree (5)

I am someone who is full of energy

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)
- 4 Agree (4)
- 5 Strongly agree (5)

I am someone who prefers to have others take charge

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)
- 4 Agree (4)
- 5 Strongly agree (5)

**We would like you to read this information carefully**

### **Control/General information**

Research has found that, by 2050, the impact of climate change could be halved by switching to more sustainable eating choices including a vast reduction in red meat consumption. Currently, 70% of the agricultural land is used for the production of animal products. Consequences of this extensive animal agriculture are increased carbon emissions, deforestation, loss of biodiversity, as well as soil degradation. Furthermore, the industry causes environmental and groundwater pollution due to insufficient waste management. The greenhouse gas emissions of the livestock industry appear to be responsible for up to 18% of the greenhouse effect, which exceeds the contribution of the complete transportation sector. Thus, livestock industries can be considered as unsustainable. Consequently, a transfer to a more plant-based diet seems to be essential to scale down climate change.

### **Summarized group information norm message**

Research has found that, by 2050, the impact of climate change could be halved by switching to more sustainable eating choices including a vast reduction in red meat consumption. Currently, 70% of the agricultural land is used for the production of animal products. Consequences of this extensive animal agriculture are increased carbon emissions, deforestation, loss of biodiversity, as well as soil degradation. Furthermore, the industry causes environmental and groundwater pollution due to insufficient waste management. The greenhouse gas emissions of the livestock industry appear to be responsible for up to 18% of

the greenhouse effect, which exceeds the contribution of the complete transportation sector. Thus, livestock industries can be considered as unsustainable. Consequently, a transfer to a more plant-based diet seems to be essential to scale down climate change.

Fortunately, recent research has shown that within the last 5 years, EU citizens have now started to make an effort to limit their animal product consumption. In recent years, already 20-30% of EU citizens have changed their behavior and begun to eat less animal products than they otherwise would.

### **Institutional norm message**

Research has found that, by 2050, the impact of climate change could be halved by switching to more sustainable eating choices including a vast reduction in red meat consumption. Currently, 70% of the agricultural land is used for the production of animal products. Consequences of this extensive animal agriculture are increased carbon emissions, deforestation, loss of biodiversity, as well as soil degradation. Furthermore, the industry causes environmental and groundwater pollution due to insufficient waste management. The greenhouse gas emissions of the livestock industry appear to be responsible for up to 18% of the greenhouse effect, which exceeds the contribution of the complete transportation sector. Thus, livestock industries can be considered as unsustainable. Consequently, a transfer to a more plant-based diet seems to be essential to scale down climate change. Currently, the EU parliament is discussing the application of laws implementing heightened taxes on animal products based on their individual environmental impact. Consequently, prices of animal products such as eggs, dairy and meat would increase by at least 30% as stated by EU spokesman Jaume Duch Guillot.

I believe that I have the ability to take action to mitigate global warming and prevent climate change, by eating less animal products.

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)
- 4 Agree (4)
- 5 Strongly agree (5)

Although it may cause me inconvenience, I can eat less animal products to mitigate global warming.

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)
- 4 Agree (4)
- 5 Strongly agree (5)

If I tried to quit eating animal products, I believe I would be likely to succeed.

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)
- 4 Agree (4)
- 5 Strongly agree (5)



Following a diet that includes little to no animal products will be hard for me.

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)
- 4 Agree (4)
- 5 Strongly agree (5)

I believe that, if we collectively change our diet to a more plant-based and sustainable one, we, as a group, can collectively act to make a positive difference in mitigating climate change.

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)
- 4 Agree (4)
- 5 Strongly agree (5)

I believe that people changing their diets to more plant-based and sustainable ones, together, can make a positive difference in mitigating climate change.

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)
- 4 Agree (4)
- 5 Strongly agree (5)

We would like to know more about your response to the previous question (optional).

Please explain in 1-3 sentences why you do (or do not) believe that adopting a more plant-based diet collectively would have a positive impact.

---

**Please rate the following statements about your motivation to eat fewer animal products. If you do not have any interest in eating fewer animal products, imagine what your motivation could result from, if you were interested. Why would you engage in eating less animal products?**

Because I would feel good when doing this activity

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)
- 4 Agree (4)
- 5 Strongly agree (5)

Because I would feel that I have to do it

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)
- 4 Agree (4)
- 5 Strongly agree (5)

Because I think that this activity would be interesting

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)
- 4 Agree (4)
- 5 Strongly agree (5)

Because I wouldn't have any choice

- 1 Strongly disagree (1)
- 2 Disagree (2)
- 3 Neither agree or disagree (3)

- 4 Agree (4)
- 5 Strongly agree (5)

How interested are you in eating less animal products?

- 1 Not at all (1)
- 2 Slightly (2)
- 3 Somewhat (3)
- 4 Moderately (4)
- 5 Extremely (5)

To what extent do you agree with this statement: “I intend to eat less animal products”?

- 1 Not at all (1)
- 2 Slightly (2)
- 3 Somewhat (3)
- 4 Moderately (4)
- 5 Extremely (5)

To what extent do you agree with this statement: “In the upcoming months, I will eat less animal products”?

- 1 Not at all (1)
- 2 Slightly (2)
- 3 Somewhat (3)
- 4 Moderately (4)
- 5 Extremely (5)

In the foreseeable future, to what extent do you think you will make an effort to eat less animal products?

- 1 Not at all (1)
- 2 Slightly (2)
- 3 Somewhat (3)
- 4 Moderately (4)
- 5 Extremely (5)

In the foreseeable future, to what extent do you think that many people will make an effort to eat less animal products?

- 1 Not at all (1)
- 2 Slightly (2)
- 3 Somewhat (3)
- 4 Moderately (4)
- 5 Extremely (5)

### Debriefing

Thank you for participating in our study.

The main aim of this study was to examine if different messages can influence people's intention to reduce their animal product consumption. We first presented the information about the health and environmental consequences of animal products, and then presented three different messages to groups of participants

- 1) a message about the government considering policy to reduce the consumption of animal products,
- 2) a message about how many other people have started to reduce their consumption of animal products, and
- 3) a control group with no message.

We also investigated if there were different effects of these messages in different age groups and for people with different levels of extraversion. Furthermore, we investigated what psychological mechanisms explained differences in how people responded to the messages. It is important to let you know that we included a small amount of deception in the messages, to make them sound more relevant to the participants that we were recruiting.

Firstly, we said the EU parliament is currently trying to implement a law about the introduction of higher taxes on animal products. This statement does not reflect reality. A similar law is, however, currently being considered in the Netherlands.

Secondly, we said that a specific number of EU citizens has started to change their behaviour, which is also not true. This message was based on statistics that reflect consumer behaviour in the Netherlands, specifically. However, to allow for including participants from different countries in the EU, we generalised the statistical findings to all EU citizens.

We expect that the two conditions with specific messages about changes in the law or in society will result in higher intentions to reduce animal product consumption, in contrast to the control group. We also expect that the two norm conditions will significantly differ from each other, and that there will be higher intentions to reduce animal product consumptions in younger age groups.

If there are any further questions about the study, please don't hesitate to contact us via [j.melander@student.rug.nl](mailto:j.melander@student.rug.nl).

Thank you for your time and cooperation.