The Impact of Different Dynamic Norm Messages on Intentions to Reduce Animal Product Consumption

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Abstract

The production of meat and other animal products contributes a significant amount to greenhouse gas emissions and thus, a reduction of animal product consumption is crucial to address climate change. Recent psychological research has aimed to find the most effective strategies to motivate consumers to eat less animal products. Dynamic norms previously have been shown to enhance people's intentions to eat less meat. The current study further investigates the effects of dynamic norms on intentions to reduce animal product consumption by comparing norms that result from changes in group behavior with norms that result from an institutional law change. Furthermore, the mediating role of self-efficacy on the relationship between the dynamic norm message and intentions is explored. Based on previous literature, we assume that both dynamic norm conditions lead to higher intentions than the control condition, and that the group behavior condition is more effective than the law condition. Additionally, it was proposed that self-efficacy mediates this relationship. We used a randomized between-subject experimental design ($N = 159$) to compare the two norm conditions and a control condition. We also measured self-efficacy to eat less animal products. Results suggest that both dynamic norm messages do not increase people's intentions and that self-efficacy does not mediate the relationship. Thus, all hypotheses were not supported by data. Further research is needed to validate these results. Limitations and practical implications are discussed.

Keywords: dynamic norms, group behaviour, institutional cues, environmental intentions, self-efficacy

The Impact of Different Dynamic Norm Messages on Intentions to Reduce Animal Product Consumption

The climate crisis is one of the most prevalent and concerning issues of the upcoming centuries and has even been named as the biggest threat to humanity (United Nations, 2021). The livestock sector is primarily responsible for global greenhouse gas emissions, with approximately 14.5% - 18% of all responsible sources (Gerber et al., 2013; Steinfeld et al., 2006). This makes the food industry one of the most important domains to address in order to diminish the consequences of climate change. Solutions to reduce the impact of animal agriculture include motivating citizens to progressively adopt vegan diets, which exclude all kinds of animal products such as meat, fish, dairy, and eggs (Marlow et al., 2009; Schösler et al., 2012; Stehfest et al., 2009). Due to the dramatic consequences of climate change in the next few years (European Commission, n.d.), exploring how individuals can be motivated to reduce their animal product consumption is crucial. The current research contributes to this by investigating if intentions to eat fewer animal products increase by using different sources of dynamic norms and additionally explores the mediating role of self-efficacy in the process. The main research question investigated is “To what extend do different dynamic norm messages enhance intentions to eat less animal products?”. Additionally, the question was asked “Is the relationship between dynamic norm messages and intentions mediated by self-efficacy?”

The Impact of Dynamic Norms

Individuals' environmental behavior is highly influenced by social norms (Cialdini & Jacobsen, 2021). Social norms are informal rules that guide individuals' decisions by referring to others in their surroundings (Bicchieri, 2006). More recently, research has highlighted the importance of dynamic norms. These communicate that increasing numbers of other people are trying to change a specific behavior, meaning that a norm is transitioning. For instance, a

static norm would convey that most people have a plant-based diet, whereas a dynamic norm would be that most people are currently trying to eat fewer animal products. As opposed to static norm messages, dynamic norm messages motivate behavioral change when only a minority of people exhibit the behavior in question. This is because static norm messages would convey that the majority does not behave in a certain way. Consequently, individuals would be unmotivated to change. In contrast, dynamic norm messages would emphasize the change that is taking place. Even though the majority does not fully engage in the desired behavior yet, individuals perceive that it is appropriate to make some changes. Sparkman and Walton (2017) investigated the effect of dynamic norms on various pro-environmental behaviors, including reducing meat consumption. Dynamic norm messages were demonstrated to increase the interest in eating less meat (Sparkman & Walton, 2017).

Furthermore, it has been shown that exposing consumers to dynamic norms helps reduce various barriers that stop people from engaging in health-related changes, including dietary choices. Obstacles to behavior change may be the belief that one is incapable of changing behavior (i.e., low self-efficacy) or that change, in general, is impossible. In addition, individuals may view behavior change as unimportant and consequently are not motivated enough to change their behavior. Finally, the individual may perceive the new behavior as incongruent with their identity. These perceptions are often altered when individuals witness others trying to change. In other words, people reconsider their perceptions once they are informed that others are engaging in a behavioral transition (Sparkman & Walton, 2019).

Different Sources of Norms

Tankard and Paluck (2016) differentiated between three types of dynamic norms: information from individuals, summarized information about groups, and information from institutions. In the current study, we focus on the two latter sources. Messages that include

summarized group information describe how other group members are behaving. Our research aims to motivate individuals by describing how other EU citizens are currently trying to reduce their animal product consumption.

By contrast, institutional cues come from system-relevant organizations such as governments (Tankard & Paluck, 2016). Politicians establish social rules in the form of laws about what is considered the most desirable behavior. In order to operate against the negative consequences of climate change, their aim should be to introduce measures that help reduce CO2 emissions. In our case, this includes implementing higher taxes on animal products. The present study will compare the effects of dynamic norm messages about summarized group behavior of EU citizens and the implementation of a law from the EU parliament.

Group Norm Cues

Information about how others behave is an essential source of appropriate behavior. Summarized group information is often presented through social media, advertisements, statistical reports, or newspaper articles (Tankard & Paluck, 2016). After receiving information about current group behavior, individuals try to adapt their behavior accordingly to avoid negative consequences (Huber et al., 2018). Various researchers found that presenting summarized information about groups motivates individuals to change, especially concerning pro-environmental behavior. One research by Goldstein and colleagues (2008) showed that people are more likely to reuse their towels when they are informed that others do the same compared to when they are merely informed about the environmental consequences. In addition, a study by Schultz and colleagues (2007) displayed that homeowners with a high electricity consumption would decrease their usage once they were told their neighbors used less. Little research has been conducted about how dynamic group norm cues motivate people to eat fewer animal products. One exception by Sparkman et al. (2021) found that knowing others are currently trying to eat less meat leads to reducing one's

own meat consumption for at least five months. The finding displays that dynamic norm messages resulting from group behavior may be an effective strategy to promote sustainable dietary transitions. Yet until now, no empirical research has investigated possible similar effects for reducing all animal products. Therefore, the current study will extend the existing literature by examining the impact of dynamic norms on the intention to eat fewer animal products.

Governmental Norm Cues

Besides learning about summarized group information, individuals can be informed about dynamic norms through institutional cues. More specifically, governments set standards of how people should behave by introducing new laws. Perceiving institutional cues makes individuals revise their view accordingly to the conveyed norm (Tankard & Paluck, 2016). An institutional signal can also be communicated dynamically, in the sense that a law change is being considered. Recent research investigated how COVID-19 measures changed norm perceptions and, ultimately, behavior. A study by Casoria et al. (2021) illustrated that introducing laws during the COVID-19 pandemic immediately adapted individuals' perceptions of norms and their actual behavior. Galbiati et al. (2021) support these results by finding that new COVID-19 laws changed social distancing norms.

It should be noted that behavior change through institutional cues is not a straightforward process. Individuals prefer to comply with new laws when they have the opportunity to participate in the decision, for instance, through a referendum, rather than simply submitting to new measures without personal input (Casoria et al., 2021). In line with this view, interventions implemented in a top-down manner, like most institutional measures, are rarely effective (Stuntz, 2000). Additionally, the amount of trust individuals have in the institution providing the norm plays a significant role for behavior change (Tankard & Paluck, 2016). Huber and colleagues (2018) highlight the importance of personal costs involved in a

behavior change encouraged by an institution. If individuals perceive that the expenses needed to engage in the behavior are low, they are more likely to adhere to it. This is because little effort is required, allowing individuals to change their behavior more easily. In contrast, a negative relationship between institutional signals and pro-environmental behavior was found if personal costs were high (Huber et al., 2018). Therefore, it may play a role to what extent individuals think reducing animal products is costly.

Importantly, existing research that has examined the influence of norm messages about laws did not consider the dynamic aspect of norms. In other words, the results described above relate to laws that were already implemented and not to those in transition. Furthermore, no empirical evidence exists about how laws would impact eating behavior. These limitations make the present research a relevant contribution to investigating to what extent institutional signals motivate pro-environmental behavior change.

Comparing the Sources

The fundamental difference between group and governmental norm messages lies in the perception of these cues. Laws are usually implemented in a top-down manner, meaning that the norm is inferred by an external factor that is already known (i.e., the law) (Biaccherie, 2017). The perceived norm of individuals will adapt accordingly over time (Tankard & Paluck, 2016). In contrast, norms referring to group information are perceived in a bottom-up mechanism. Bandura (1977) states that norms arise as individuals learn about what is considered appropriate behavior through observation and interactions with others. Thus, a norm that develops through group information is established in an upward process.

Both, messages that inform about group behavior and ones that describe laws convey normative information. The question remains which norm message encourages individuals to change behavior to a greater extent. Few studies have investigated this topic so far, making it crucial to discover in the present research. Assuming that perceiving group behavior and

consequently adjusting one's own behavior is a voluntary process, behavior may change to a greater extent than when institutional cues are given. It has been suggested that external regulations may decrease people's intrinsic motivation to engage in a particular behavior, affecting the persistence and quality of the behavior change (Ockwell et al., 2009). In line with these findings, voluntary environmental regulations have been shown to be more efficient than mandatory regulations (Wu & Babcock, 1999). In contrast, other research has shown that compulsory interventions introduced by governments motivate firms to adjust their environmental strategies the most (Aragon-Correa et al., 2008). Huber and colleagues (2018) demonstrated that a norm message about group information on its own did not lead to a pro-environmental behavior change. However, in combination with norms about institutional signals, pro-environmental behavior increased. It should be pointed out that in contrast to the current study, Huber and colleagues (2018) used static norm messages instead of dynamic norm messages.

The limited research about the comparison between the two norm sources provides mixed results. Therefore, it is essential to further investigate the difference of effectiveness to promote behavior change between group information and governmental cues.

Self-Efficacy

To further understand how individuals can be directed to reduce their animal product consumption, it is crucial to understand the mechanisms behind the effects of different dynamic norm messages. One factor that has been proposed to be essential for norm messages to influence individuals is self-efficacy, i.e., one's own belief to be able to change in the desired way (Bandura, 1993). Especially with regard to promoting sustainable behavior, self-efficacy is highly correlated with one's actual ability to make behavioral changes (Bandura, 1977; Deci & Ryan, 2000). Additionally, environmental self-efficacy (i.e., the belief that one can perform pro-environmental behaviors) has been shown to directly influence people's

intentions to engage in recycling (Huang, 2015). Similarly, climate change efficacy has been demonstrated to overcome helplessness, leading to higher intentions to conserve energy (Salomon & Preston, 2017). On the other hand, the belief that one cannot engage in a particular behavior (i.e., low self-efficacy) has been shown to prevent behavior changes (Sparkman and Walton, 2019). The same research found that self-efficacy partially explained the effect of dynamic norm messages on intentions to make health-related changes, such as avoiding sugary drinks and quitting smoking. Likewise, Stok and colleagues (2014) investigated how self-efficacy mediates the relationship between descriptive norm messages and vegetable intake. They demonstrated that static descriptive norm messages enhance self-efficacy to eat more vegetables and that higher self-efficacy in return leads to a high intentions to eat a sufficient amount of vegetables (Stock et al., 2014). As dynamic norms have been shown to be even more influential in encouraging pro-environmental behaviors than static norms (Sparkman & Walton, 2017), it can be assumed that self-efficacy would similarly mediate the relationship between dynamic norms and a decreased animal product consumption.

Despite the previously mentioned findings about the role of self-efficacy in pro-environmental behavior change, only a few studies have examined the influence of self-efficacy on intentions to eat fewer animal products. This makes our study even more relevant. Importantly, different sources of norm messages could impact self-efficacy to different extents. Knowing that others similar to oneself can achieve a specific behavior increases self-efficacy (Jungert, 2010). Thus, it can be assumed that messages informing about a change in group behavior make individuals believe that they can also change. In contrast, a legal message does not show that individuals already follow the behavior; instead, it shows that it is the desired behavior (Tankard & Paluck, 2016). Therefore, we expect that a dynamic norm message about group behavior leads to higher self-efficacy than a message about a law does.

This, in return, may lead to higher intentions to eat fewer animal products. Self-efficacy is thus likely to explain possible differences in the effects of the two dynamic norm messages.

Current Research

In the present study, we aim to investigate the difference between dynamic norms communicated through group information and governmental cues on intentions to consume less animal products. Previous findings indicate that all dynamic norm messages will motivate people to eat fewer animal products (Sparkman & Walton, 2017). However, the little existing literature comparing the two types of messages (i.e., group and government) has mixed results (Huber et al., 2018; Tankard & Paluck, 2016; Wu & Babcock, 1999). Additionally, no research has investigated the impact of different norm messages on eating fewer animal products. Thus, we aim to extend the current literature by exploring the difference between group and governmental dynamic norm messages on intentions to reduce the consumption of animal products. A possible reason for differences between dynamic norm messages might be that individuals' self-efficacy to reduce their animal product consumption differs. This is why self-efficacy qualifies as a possible mediator. The current study's findings will have considerable implications for designing interventions that decrease animal product consumption. Taking previous literature into account, we expect the following[1].

Hypothesis 1. Both dynamic norm conditions will lead to higher intentions to reduce animal product consumption than the control group.

Hypothesis 2. The dynamic norm message about summarized group behavior will lead to higher intentions for reduction than the message about the EU parliament's current implementation of a new law.

Hypothesis 3. The difference between the two norm conditions described in Hypothesis 2 is mediated by self-efficacy., i.e., the belief that one can reduce consuming

[1]In addition to the hypotheses described, we aim to investigate actual behavior change as an exploratory variable, since we did not have any directional hypothesis for behavior.

animal products and have an impact to prevent climate change. More specifically, we expect that the dynamic norm message about group behavior results in higher self-efficacy than the message about law changes.

Method

Participants

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 those 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 aged between 18 and 35 years, 19.5% were in the age group of 36-50 years, 15.7% indicated to be between 51 and 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, 40 participants identified themselves as a vegetarian (25.2%), 86 as meat reducers (54.1%), thirty as meat-eaters (18.9%), and three participants answered ‘other’ (1.9%). There were 99 german (62.3%), 47 dutch (29.6%), and 13 participants from other countries (8.2%). The participants were recruited through snowball sampling to achieve a more generalizable sample. Participants took part in the study voluntarily and did not receive compensation for their participation.

Design and Procedure

The present study is a between-subject randomized experiment with intentions of reducing animal products as a dependent variable. 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 to protect the participants' identities. Before the start of the study, every participant received information about the research and an informed consent form. After the questionnaire, they obtained a debriefing form (all of these can be found in Appendix A). We sent out the online survey using a Qualtrics link shared via email, WhatsApp, or other social media. The data collection took place for 17 days, and the survey lasted about 10 minutes. Participants were randomly assigned to one of three experimental conditions. After indicating demographics and intentions[2], all participants were asked to read a text about the impact of animal products. The two norm conditions additionally included a dynamic norm message at the end. Following this, we assessed self-efficacy to reduce animal product consumption. Finally, we assessed intention to reduce animal product consumption again, followed by one question assessing the perceived likelihood of a norm change in the future[3].

Introductory Content

Every participant received the same introductory information before the manipulation, ensuring a similar level of knowledge. The text described the environmental impact of animal products. More specifically, we stated the negative consequences of eating animal products and concluded that eating animal products can be considered unsustainable (see Appendix B

[2] We also assessed consumption of animal products. The original aim was to compare the first measure (main survey) with a second measure (follow-up), to investigate a possible change in behavior. This could not be accomplished due to insufficient follow-up answers (n = 35).

[3]A follow up survey was sent a week after the initial survey to the participants email addresses. The follow up included one item about participants animal product consumption in the past week and five items asking about participants intentions.

for full text). The control condition received the text without the manipulation sentences afterwards (see manipulation below).

Manipulation

We used a dynamic-norm message in two of our experimental conditions, communicating either a norm change in group behavior or a law change. 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). For the law 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.

Measures

The word “meat” was changed to “animal products” to adapt the original questions to our research question. All the scales and questions were translated into German and Dutch to broaden our sample group. Additional measures that were assessed for the purposes of other researchers but are beyond the scope of this paper can be found in Appendix C[4]. The scales were included in the survey in the following order (for complete survey see Appendix D).

Demographics and Diet

Participants were first asked to indicate their gender ("What gender do you identify with?; *Male, Female, Non-Binary, Prefer not to say*) and their age ("Please indicate your age

[4] The full survey also included one item about participants animal product consumption in the past week, which is not described here because we were not able to use it for further analysis (see Appendix C).

group"; *18-35, 36-50, 51-64, 65 and older*). We then asked two open questions about participants' nationality and email addresses[5]. Lastly, we asked for participants' diets with one item: "Which of the following best describes your diet?". The answer options were *meat eater, meat reducer, vegetarian, vegan, and other.*

Intention

We measured participants' intentions to reduce their consumption of animal products with four items before introducing our manipulation as well as after it. 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 effort to eat less animal products?". A five-point Likert scale was used (1 = *not at all*, 5 = *extremely*). The items showed a excellent reliability of $\alpha = 0.93$.

Self-Efficacy

We adapted four items measuring self-efficacy from three different studies (Huang, 2015; Lacroix, & Gifford, 2019; Sparkman & Walton, 2019). A five-point Likert scale was used (1 = *strongly disagree*, 5 = *strongly agree*). The final items were "I believe that I have the ability to take action to mitigate global warming and prevent climate change, by eating less animal products.", "Although it may cause inconvenience, I can eat less animal products to mitigate global warming.", If I tried to quit eating animal products, I believe I would be likely to succeed." and "Following a diet that includes little to no animal products will be hard for me." Since the last item was phrased reversed compared to the other three items, we transformed the variable into a new one using reversed coding. The items showed an acceptable Cronbach's alpha of .7.

[5] The purpose of asking for participants email addresses was to send out the follow-up survey a week after the first survey.

Manipulation Check

To check whether the dynamic norm messages successfully conveyed that a change of norms is happening, we included one item about participants' perceived future norm regarding the consumption of animal products. After the manipulation, we asked the following question "In the foreseeable future, to what extent do you think that many people will make an effort to eat less animal products?". This item was based on Sparkman and Waltons (2017) preconformity measure and could be answered with a Likert scale (1 = *not at all*, 5 = *extremely*).

Results

Preliminiary Analysis

A preliminary analysis was performed to test whether the main statistical assumptions were met, in order to conduct a univariate analysis of covariance (ANCOVA). Independence of observations was presumed due to the study's design. The Levenes test of homogeneity of variances showed non-significant result, $F(2,156) = 2.21$, $p = .11$, meaning that the assumption of homogeneity was met. QQ-plots showed that normality was roughly met. Furthermore, the inspection of scatterplots showed that the covariate and the independent variable were linearly related at each level of the dependent variable. Five participants who reported very low intentions were identified as outliers. However, due to the importance of considering unmotivated participants as well as only minimal changes in statistical outcomes after exclusion, the final analysis included these participants. All graphs for the assumption checks can be found in Appendix E.

Conformitory Analysis

Manipulation Check

We analyzed the item about future expected norms using a univariate analysis of variance (ANOVA) analysis to check if any significant differences occurred between the three

conditions. Results showed that there were no significant differences between the three conditions, $F(2,156) = 1.63$, $p = .20$, $\eta_p^2 = .02$. Participants who were exposed to a group behavior dynamic norm message ($n = 50$, $M = 3.36$, $SD = .96$) or a law dynamic norm ($n = 61$, $M = 3.13$, $SD = .87$) message did not perceive that the future norm will be to eat less animal products to a greater extent than the in the control condition ($n = 48$, $M = 3.42$, $SD = .82$). Thus, the manipulation of dynamic norm message did not work as intended.

Main Analysis

For the main analysis, we performed a univariate analysis of covariance (ANCOVA). Alternatively, we could have used ANOVA analysis with change from baseline intentions as a dependent variable, but we preferred an ANCOVA due to its higher power (Van Breukelen, 2006). We used with intentions as a dependent variable and dynamic norm condition as an independent variable. Baseline intentions (i.e., intentions before manipulation) were used as the covariate, in order to rule out any effects of different baseline intentions between the groups. Results showed that intentions after manipulation of participants of the control condition ($M = 3.71$, $SD = .9$), the group behavior condition ($M = 3.77$, $SD = .88$) and the law condition ($M = 3.63$, $SD = .98$) did not differ significantly, $F(2,155) = .17$, $p = .84$, $\eta_p^2 = .002$. Thus, data did not support the first two hypotheses[6].

Mediational Analysis

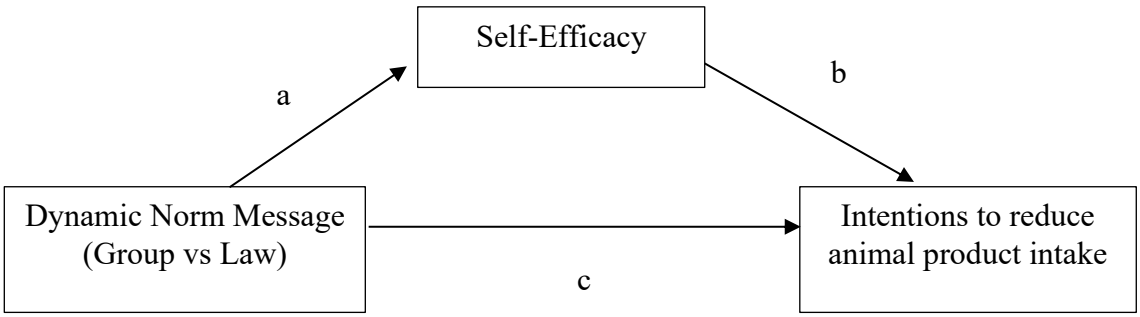
Self-efficacy was expected to mediate the relationship between dynamic norm condition and intentions (Hypothesis 3). Although a significant effect in our main analysis was not found, a mediation analysis was done considering that direct paths and indirect paths (via a mediator) differ in statistical power (Rucker et al., 2011). I used PROCESS macro (Hayes, 2022, Model 4) to conduct a simple mediation analysis (5000 bootstrap samples; Figure 1) to investigate an indirect effect (denoted as *ab*) of dynamic norms on intentions via

[6] We did not conduct an exploratory analysis with actual animal product consumption as a dependent variable like we originally intended due to the insufficient sample size of the follow up survey ($n = 35$).

self-efficacy (n = 111). A dummy variable was created and used for the independent variable (group behavior condition. = 0; law condition = 1). Results showed that the direct effect of dynamic norm condition on intention was not significant, B = -.07, SE = .13, 95% CI [-.32, .18], p = .59. Furthermore, the indirect effect via self-efficacy was also not significant, ab = -.07, SE = .12, 95% CI [-.32, .18]. No significant effect of dynamic norm message on self-efficacy was found, a = -.09, SE = .17, 95% CI [-.42, .24], p = .58. However, results suggested a significant relationship between self-efficacy and intentions, b = .76, SE = .07, 95% CI [.61, 0.9], p < .001. However,

Figure 1

Mediational Model



Discussion

The current study examined the relationship between different dynamic norm messages and intentions to reduce animal product consumption. Further, it was investigated whether this proposed relationship is mediated by self-efficacy. Two dynamic norm conditions (i.e., group behavior and law) were compared with each other and a control condition. Past research suggested that dynamic norms motivate sustainable dietary decisions (Sparkman & Walton, 2017, 2019). In fact, dynamic norm messages may be particularly useful in motivating behaviors which are currently not practiced by the majority (e.g., consuming little animal products). Thus, we hypothesized that both dynamic norm messages

would lead to higher intentions to reduce animal product consumption than the control condition. The findings were not in line with our expectations. We believe this is primarily due to several methodological differences between our study and the research of Sparkman and Walton (2017). They compared dynamic norm messages with static norm messages, whereas we focused on two types of dynamic norm messages. Additionally, they investigated the influence of dynamic norms to eat less meat, which we broadened to all animal products. The present study also used longer manipulation texts compared to Sparkman and Walton (2017).

In addition, a possible explanation for the current study's non-significant results is the trend perception of consuming little animal products. Veganism can be considered a trend due to its enormous growth in popularity in recent years (Kim, 2022). Sparkman and Walton (2017) mentioned that dynamic norms are less likely to increase intentions if the behavior is perceived as a trend that is expected to pass. Their explanation for this observation is that indivuals are less motivated to change their behavior, if they perceive that a future norm will be different than the current norm (as the trend will pass). Our manipulation check revealed that the participants did not expect a future norm in which a majority of people eat only a few animal products. Thus, it may be possible that the participant’s intentions did not increase due to their perception that consuming less animal products is merely a trend.

Past studies which examined the difference between norms with group behavior information and institutional cues showed mixed evidence (Aragon-Correa et al., 2008; Huber et al., 2018; Wu & Babcock, 1999). A slight tendency in the literature suggests that institutional cues are less motivating than group behavior cues because they imply involuntary behavior change (Ockwell, 2009; Wu & Babock, 1999). In line with this direction, we expected that the group behavior condition would significantly impact intentions more than the law condition. Results imply that messages about group behavior do not lead to higher

intentions than messages about a law. It may be possible that a distinction between the two sources is unnecessary when aiming to motivate pro-environmental behavior. Alternatively, it could also be that only both norm messages in combination motivate individuals to change, as Huber and colleagues (2018) previously demonstrated. Nevertheless, since no differences between all three groups occured, it remains difficult to conclude anything about possible differences in impacts between summarized group information and laws.

Self-efficacy was assumed to mediate the relationship between dynamic norm conditions and intentions. Our data did not support this hypothesis. We cannot be sure if this is due to an insufficient manipulation of the dynamic norm messages or the actual non-significant mediational effect. However, in line with previous research (Deci & Ryan, 2000; Salomon & Preston, 2017), we found that self-efficacy did predict intentions to reduce animal product consumption.

Strengths

The present study extended previous literature about the influence of norms in several ways and is thus of high importance. Although there has been much evidence that static norms motivate pro-environmental behavior, sparse research has investigated the effects of dynamic norms. The research that investigated the impact of dynamic norms showed a promising effect on reducing meat consumption (Sparkman & Walton, 2017), which we broadened to all animal products. By including a control group, we could test if changes in intentions appeared due to the dynamic norm messages. Compared to various other studies, our sample group was not restricted to university students, making the results more generalizable (although our sample was still limited, as discussed below). By randomizing participants to the three conditions, we prevented selection biases.

Limitations and Future Research

The non-significant findings of the study might have resulted from several methodological limitations. Most importantly, the dynamic norm messages were conceivably not manipulated effectively. The manipulation check revealed that the dynamic norm messages did not change participants' perceptions that in the future, fewer animal products will be eaten. Thus, we can conclude that our manipulation did not work as intended. We also think that the length of the overall message might have been too long, as it included an extensive text with general information about the environmental impact of animal products before mentioning the relevant dynamic norm message. Consequently, participants often skimmed through the text, as shown by the timing variable of our study. Thus, proper exposure to the dynamic norm message was not ensured for all participants. For future replications, we suggest making the dynamic norm message more salient by including only sparse general information and to check whether participants read the dynamic norm messages (i.e., comprehension check). For example, one could exclude individuals who fell below a predetermined cutoff score on the time variable, which reflects an appropriate reading time. We only excluded participants who scored below one second because we already had an insufficient sample size. Further exclusion would have decreased the study's power even more. Additionally, running a pilot test to see if the dynamic norm messages are phrased effectively would be a recommendable option for future studies.

In the present research, all participants were exposed to general information about the impact of animal products on climate change, which might have served as a confounding variable. This could explain the non-significant difference between the two norm conditions compared to the control condition. For future research, we propose to expose participants in the control group to an unrelated and neutral message, for example, a weather forecast. This would make the distinction between the three conditions more clear.

The awareness about the environmental consequences of one's own animal product consumption might also have led to high intentions due to social desirability. Previous research has found discrepancies between self-reported and observed environmental behaviors (Kormos & Gifford, 2014), implying that participants may tend to give responses that they believe will make them appear in a positive light. Research shows that even slight signals of observation lead participants to report their answers untruthfully (Haley & Fessler, 2005). We asked participants for their email addresses which might have served as a cue for observation. Consequently, intentions to reduce animal product consumption might have been reported higher than they were. Replications of our study should either avoid asking for participants' email addresses or include items that identify social desirability bias.

A further issue in the current study is the participant size and the homogeneity of the group. After excluding vegans and incomplete datasets, we did not have enough participants, making our study underpowered. Additionally, the final sample mainly consisted of participants aged 18 to 35 who were primarily female. Ultimately, the sample group is not fully generalizable to through these limitations.

Practical Implications

Assuming that an improvement of the previously mentioned limitations would lead to significant differences between the three conditions, one should consider the practical implications of possible findings. Dynamic norm messages could then be utilized to motivate individuals to consume fewer animal products, but it would be necessary to first validate that intentions lead to actual behavioral changes[7]. Advertisements that highlight the current change of others could motivate consumers to buy more plant-based alternatives. If group behavior messages are indeed more effective than law messages, these interventions should

[7] Initially, we wanted to investigate this with our follow-up study. Due to the insufficient answers on these follow-up questions, we are not able to conclude anything about actual behavioral changes motivated through dynamic norm messages.

refer to other consumers' behavior than to governmental decisions. However, more research is needed to determine whether a differentiation between the two norm sources is necessary. Considering that self-efficacy was shown to be influential in enhancing intentions, it would be even more beneficial to investigate ways to increase an individual's self-efficacy. Nevertheless, it must be noted that these suggestions are only applicable once further research has thoroughly established that different dynamic norm messages increase people's intentions.

Conclusion

Conclusively, the current study investigated the effects of two different norm conditions on people's intentions to eat fewer animal products. Both dynamic norm messages did not lead to higher intentions than the control condition. Additionally, self-efficacy did not mediate the relationship between dynamic norm messages and intentions. Definite conclusions and implications are difficult to make due to the study's limitations. The influence of dynamic norms on sustainable eating behavior remains a critical area of research that should be investigated more in the future due to its implications for preventing climate change.

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Appendix A

Information About the Research, Informed Consent and Debriefing Form

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.

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.

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. As a research participant, you have the right to a copy of this research information.

Informed Consent

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:

a) Yes, I consent to participate; this consent is valid until 27-06-2022

b) No, I do not consent to participate

Consent to processing my personal data:

a) 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.

b) No, I do not consent to the processing of my personal data.

Debriefing Form

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 . Thank you for your time and cooperation.

Appendix B

Full Introductory Text

Introductory Content

The following text was shown to all participants: “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.”

Appendix C

Additional Measures

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 could 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.

Extraversion

To measure the personality trait extraversion we used the extraversion subscale of The Big Five Inventory-2 (BFI-2), which is a revision of the Big Five Inventory (BFI) (Soto & John, 2017). It shows a more robust hierarchical structure, an improved control for individual differences in responses as well as greater predictive power than the BFI. We used five questions from the personality trait extraversion subscale out of the 12 questions offered by the BFI-2 (Soto & John, 2017). We decided not to use all the questions for extraversion to avoid making the questionnaire uncomfortably long for the participants. We included the questions with the highest internal reliability, choosing three reversed and two regular phrased questions, $\alpha = .88$. The answers could be given on a Likert scale (1= strongly disagree, 5 = strongly agree).

Collective efficacy

Two items were used for measuring "Collective Efficacy". These items were adapted from van Zomeren et al. (2013) and found in the article by Judge et al. (2022). The items are suited to measure collective efficacy because they address the belief that a group can attain a goal by working towards the achievement together ($r = .76$). The questions were phrased in the following way: "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." and "I believe that people changing their diets to more plant-based and sustainable ones, together, can make a positive difference in mitigating climate change." They could be answered from 1 = strongly disagree to 5 = strongly agree.

Belief About Impact

One open question was added to increase our understanding of why people (do not) think that collectively adopting a more plant-based diet could have a positive impact. The question was optional and phrased as follows "We would like to know more about your response to the previous question (optional). Please explain in 1-2 sentences why you do (or do not) believe that adopting a more plant-based diet collectively would have a positive impact."

Intrinsic and extrinsic motivation

Four items were used to measure intrinsic and extrinsic motivation. These questions were taken from Guay et al. (2000), (α = .95 for intrinsic motivation, α = .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. The two answer options for an intrinsic motivation were "Because I would feel good when doing this activity" and "Because I think that this activity would be interesting", using a five point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). The two answer options indicating extrinsic motivation were "Because I would feel that I have to do it" and "Because I wouldn't have any choice", using the same Likert scale.

Appendix D

Complete Survey (for research information, informed consent and debriefing, see appendix A)

Please indicate your age group

18-35 (1)

36-50 (2)

51-64 (3)

65 and older (4)

Please state your nationality

_____

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

_____

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?

Number of servings per week: 0 ——————————21

How interested are you in eating less animal products?

Not at all (1)

Slightly (2)

Somewhat (3)

Moderately (4)

Extremely (5)

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

Not at all (1)

Slightly (2)

Somewhat (3)

Moderately (4)

Extremely (5)

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

Not at all (1)

Slightly (2)

Somewhat (3)

Moderately (4)

Extremely (5)

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

Not at all (1)

Slightly (2)

Somewhat (3)

Moderately (4)

Extremely (5)

Please answer the following questions about your personality.

I am someone who has an assertive personality

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

Strongly agree (5)

I am someone who rarely feels excited or eager

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

Strongly agree (5)

I am someone who finds it hard to influence people

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

Strongly agree (5)

I am someone who is full of energy

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

Strongly agree (5)

I am someone who prefers to have others take charge

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

Strongly agree (5)

We would like you to read this information carefully

Control Condition

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.

Group Behavior Condition

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

Law Condition

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.

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

Strongly agree (5)

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

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

Strongly agree (5)

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

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

Strongly agree (5)

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

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

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.

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

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.

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

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

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

Strongly agree (5)

Because I would feel that I have to do it

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

Strongly agree (5)

Because I think that this activity would be interesting

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

Strongly agree (5)

Because I wouldn't have any choice

Strongly disagree (1)

Disagree (2)

Neither agree or disagree (3)

Agree (4)

Strongly agree (5)

How interested are you in eating less animal products?

Not at all (1)

Slightly (2)

Somewhat (3)

Moderately (4)

Extremely (5)

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

Not at all (1)

Slightly (2)

Somewhat (3)

Moderately (4)

Extremely (5)

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

Not at all (1)

Slightly (2)

Somewhat (3)

Moderately (4)

Extremely (5)

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

Not at all (1)

Slightly (2)

Somewhat (3)

Moderately (4)

Extremely (5)

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

Not at all (1)

Slightly (2)

Somewhat (3)

Moderately (4)

Extremely (5)

Appendix E

Assumption Checks

Figure 2

Boxplots for post-manipulation intentions

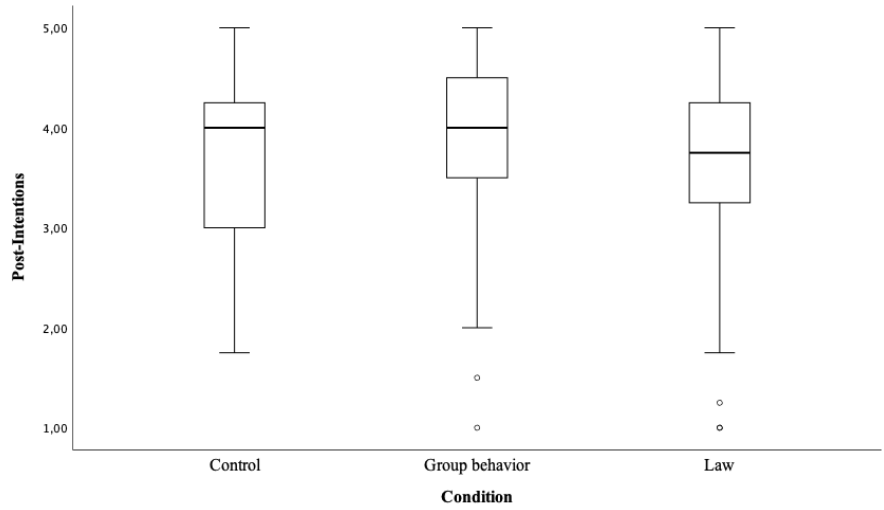


Figure 3

Normal QQ-Plot of intentions for control condition

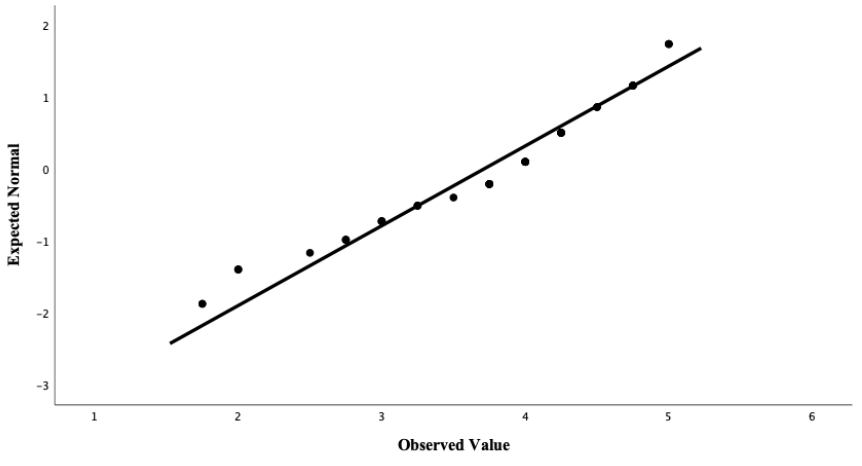


Figure 4

Normal QQ-Plot of intentions for group behavior condition

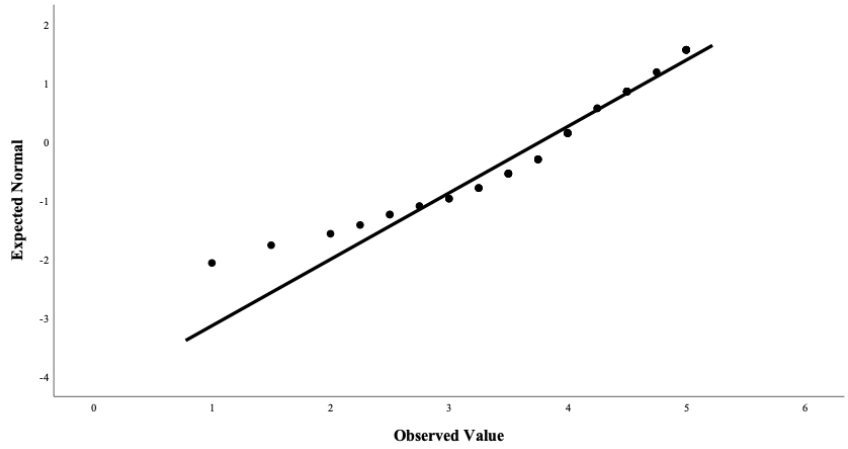


Figure 5

Normal QQ-Plot of intentions for law condition

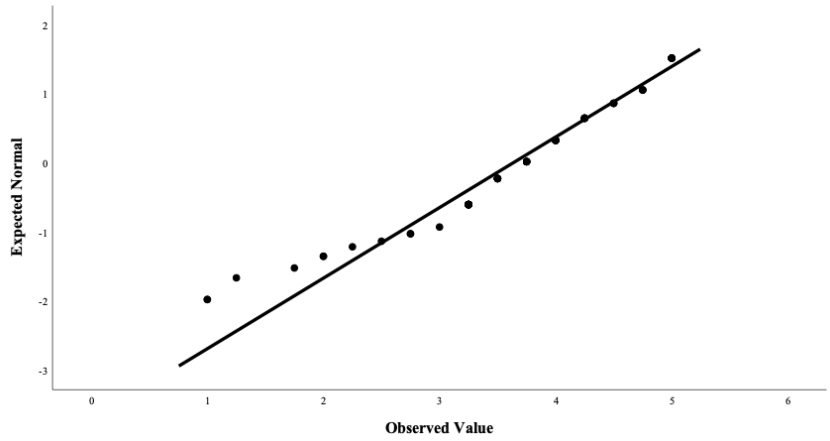
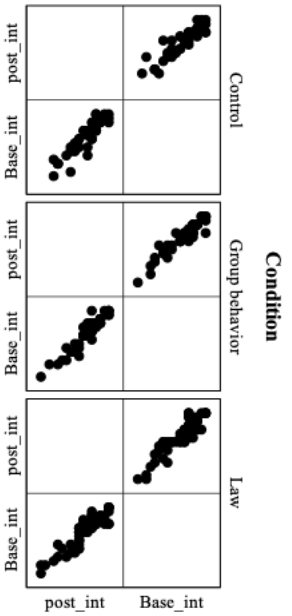


Figure 6

Matrix Scatterplot of baseline intentions and intentions



Note. The scatterplot indicates a linear relationship between the covariate and the independent variable at all levels of the dependent variable.