**Introduction**

Masses of people today are living lifestyles abundant in consumption (Matsuyama, 2002; Trentmann, 2004), and this consumption is driving the planet towards becoming a more inhospitable place to live (Hoekstra & Wiedmann, 2014; IPCC, 2014; Ripple et al., 2019). Lifestyles are patterns of behavioral choices that are steered by human psychological tendencies (Dean et al., 1995). Thus, a psychological approach could provide key insights into how strategies can be developed to alter high-consumption lifestyles. Specifically, one of the psychological tendencies that influences people’s behavior is their proneness to adapt their behavior to match prevailing norms in their group (Miller & Prentice, 2016). The purpose of the current project is to develop and test the effectiveness of a psychological intervention that changes people’s perception of consumption norms to reduce their consumption.

People engage in many consumer activities on a daily basis, like heating and cooling their homes, driving in personal cars, and purchasing food and clothing, that generate, and provide demand for the generation of, massive amounts of greenhouse gas (GHG) emissions (Hertwich & Peters, 2009; Ivanova et al., 2015). These GHGs accumulate in the Earth’s atmosphere, leading to warmer global temperatures, rising sea levels, more extreme weather events, and ultimately a planet that is more threatening to human safety and sustainability. By 2100, if no additional mitigation efforts are made, we are projected to live in a world that is 3.7°C to 4.8°C warmer than it was during the pre-industrial era, which would create severe environmental consequences for many people (IPCC, 2014). To avoid this, the Intergovernmental Panel on Climate Change (IPCC) has set a goal of limiting warming to 1.5°C by reducing human emissions to zero by 2050.

There are two main climate-change mitigation approaches: supply- and demand-sided strategies. Demand-sided strategies involve reducing demand for products and services that generate GHG emissions (e.g., by reducing high-consumption lifestyles). Supply-sided strategies involve reducing the supply of GHGs to the atmosphere by altering manufacturing processes to produce goods and services in ways that do not emit GHGs as well as by expanding technological innovations that remove GHGs from the atmosphere (e.g., carbon capture) and provide energy while producing little to no GHGs (e.g., renewable energy) (IPCC, 2018). Supply-sided solutions are enticing because they do not involve people having to change their current lifestyles and can coincide with continued economic growth. Despite their appeal, though, they have significant weaknesses that suggest they will not, on their own, be enough to prevent alarming levels of warming from occurring (Hoekstra, 2014; IPCC, 2018).

For example, there is great uncertainty regarding whether carbon capture technologies can scale quickly enough to remove the amounts of GHGs from the atmosphere that are needed to reduce emissions to zero by 2050. Furthermore, to meet operation costs, carbon capture companies sell carbon dioxide to oil companies to be used for enhanced oil recovery, a process of injecting CO2 underground to extract oil more effectively, which results in increased emissions (Kolster et al., 2017). It is unclear whether carbon capture companies will be able remove the gigatonnes of CO2 that are currently in the atmosphere in addition to being able to offset the increase in emissions that result from this business practice. As stated by the IPCC (2018), carbon capture “deployed at scale is unproven, and reliance on such technology is a major risk in the ability to limit warming to 1.5°C.”

Consumers could also argue for the reliance on supply-sided strategies by asserting that the responsibility for reducing GHG emissions should be on corporations rather than on individuals (Pereira Heath & Chatzidakis, 2014). After all, corporations encourage overconsumption via marketing, and they are producing, and profiting from the production of, GHGs. This approach would mean relying on companies to invest resources, very quickly, into decarbonizing their supply chains. However, our high-consumption lifestyles make corporations’ current infrastructures very profitable (US Census Bureau, 2022). Companies have less motivation to invest in making changes to improve the sustainability of their manufacturing processes when these changes are not associated with financial benefits (O’Rourke, 2014). That being so, current consumption practices likely create little incentive for corporations to make costly investments in restructuring their supply chains, much less at the scale and speed that is necessary to reach net-zero emissions in 27 years.

Thus, by themselves, technological innovations and corporate transformations are very unlikely to mitigate the climate crisis. However, in tandem with demand-sided strategies, supply-sided strategies have greater chances at success (IPCC, 2018). For instance, if individuals were to collectively reduce their consumption in order to reduce GHG emissions, this would provide the financial incentive companies may need to be motivated to decarbonize their supply chains. Widespread reductions in consumption would also decrease the need to generate as many GHGs, which would give technologies like carbon capture a more reasonable chance of achieving their goal of removing all excess GHGs from the atmosphere.

Demand-sided strategies are increasingly being seen as a necessary part of the climate solution (Creutzig et al., 2018). Specifically, there is rising interest in how reductions can be made in people’s levels of consumption (Druckman & Jackson, 2010; Dubois et al., 2019; Girod, van Vuuren, & Hertwich, 2014; Wiedmann, Lenzen, Keyβer, & Steinberger, 2020). The purpose of the current project is to investigate how psychological interventions can be used to encourage people to reduce the amount of consumption they engage in.

The field of social psychology already has an established history of developing interventions aimed at encouraging people to adopt more environmentally-friendly behaviors. One of the most commonly used approaches is the norm intervention (Bohner & Schlüter, 2014; Carrico & Riemer, 2011; Cialdini, Reno, & Kallgren, 1990; Cialdini et al., 2006; de Groot, Abrahamse, & Jones, 2013; Dwyer, Maki, & Rothman, 2015; Ferraro, Miranda, & Price, 2011; Goldstein, Cialdini, & Griskevicius, 2008; Handgraaf, Van Lidth de Jeude, & Appelt, 2013; Kallgren, Reno, & Cialdini, 2000; Lapinski, Rimal, DeVries, & Lee, 2007; Melnyk, Herpen, Fischer, & van Trijp, 2011; Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008; Oceja & Berenguer, 2009; Reese, Loew, & Steffgen, 2014; Reno, Cialdini, & Kallgren, 1993; Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007; Schultz, Khazian, & Zaleski, 2008; Smith et al., 2012). “Norms” have been defined as the behavioral rules understood by members of a group that guide or constrain group members’ behaviors (Cialdini & Trost, 1998) and that are upheld by people’s expectations that the rules are endorsed by other members of their group (Bicchieri, 2006). Norm interventions work by altering people’s perception of the norms that are endorsed by the people around them.

There are several strengths of norm interventions that make them a potentially valuable climate-mitigation tool. First, this type of intervention has been able to produce significant increases in people’s willingness to adopt more environmentally-friendly practices across a number of different behaviors (e.g., recycling, conserving water and energy, and reusing towels) (Goldstein et al., 2008; Lapinski et al., 2007; Nolan et al., 2008; Schultz, 1999). Additionally, norm interventions are low cost and easy to implement to large audiences, which is useful for the issue of climate change which has a global audience. However, current norm interventions also have some weaknesses, including that sometimes the effects of norm interventions are inconsistent across studies, and they also often produce small effect sizes (Farrow et al., 2017; Poškus, 2016). This suggests that there is room for norm interventions to be improved upon.

In the following sections of this introduction, I will 1) review the characteristics of currently used norm interventions and identify potential areas for improvement, 2) suggest methodological changes that could strengthen the efficacy of norm interventions, and 3) explain how these changes are being implemented to develop and test novel norm-intervention conditions in the current project.

**Shared Characteristics of Current Norm Interventions**

Currently used norm interventions share three notable characteristics. First, norm-intervention conditions typically rely on the descriptive-injunctive norm dichotomy. Descriptive norms are frequently defined as behaviors that people perceive as being widely adopted by their group, while injunctive norms describe behaviors that people think others believe *ought* to be widely adopted (Cialdini, Reno, & Kallgren, 1990). In norm-intervention studies, the descriptive norm condition often takes the form of a normative message that informs participants that a majority of other people around them engage in a particular pro-environmental behavior (e.g., “85% of people in your neighborhood recycle”). The injunctive norm condition is often a normative message that informs participants that a majority of other people around them believe that it is *right* to engage in a pro-environmental behavior (e.g., “85% of the people in your neighborhood approve of people who recycle”).

These are the two types of norms that are most often manipulated in norm interventions. Farrow et al. (2017) performed a review of norm-intervention studies to summarize their overall effectiveness on pro-environmental behaviors. Of 23 norm-intervention studies reviewed, 13 included a descriptive norm condition, five included an injunctive norm condition, and five included a condition that combined a descriptive and injunctive norm. Only one study in the review included a norm-intervention condition that was not either a descriptive or injunctive norm.

This shared characteristic is worth noting as a potential area for improvement because more types of norms exist beyond just descriptive and injunctive norms. Different types of norms have different persuasive powers, and the effectiveness of a norm-intervention condition could depend on the type of norm that is manipulated. In fact, in Farrow et al. (2017), they found that descriptive norms produced significant, positive changes in people’s willingness to engage in pro-environmental behaviors more consistently than did injunctive norms. The same pattern was found in a meta-analysis that evaluated how correlational evidence of the relationship between perceived norms and pro-environmental outcomes varied depending on the type of norm (Niemiec, Champine, Vaske, & Mertens, 2020). Descriptive norms were more consistently significantly related to pro-environmental outcomes than were injunctive norms.

Given that the relationship between norms and pro-environmental outcomes varies depending on the type of norm, it is worthwhile to investigate the efficacy of a broader range of types of norm-intervention conditions. In the following section, I will elaborate further on how the current project is developing and testing novel norm-intervention conditions based on types of norms that have not been previously investigated.

A second characteristic shared among norm-intervention studies is that they most often contextualize the behavior that they want people to adopt as being in pursuit of, or aligned with, pro-environmental goals. This is called pro-environmental framing. For instance, in a study attempting to promote towel reuse among hotel guests, the descriptive norm message read, “Join your fellow guests in *helping to save the environment*. Almost 75% of guests who are asked to participate in our new resource savings program do help by using their towels more than once” (Goldstein et al., 2008). In a study aimed at reducing plastic bag usage in supermarkets, grocery patrons read an injunctive norm message that said, “Shoppers in this store believe that re-using shopping bags is *a worthwhile way to help the environment*. Please continue to re-use your bags” (de Groot, Abrahamse, & Jones, 2013).

Researchers have described this framing as a social dilemma that pits one’s short-term self-interests against the long-term interests of the group (Nordlund & Garvill, 2003). That is, messages like these encourage people to adopt pro-environmental behaviors with long-term sustainability benefits that are in the short-term less convenient, less indulgent, and/or less immediately gratifying. Even without the additional pro-environmental language that is often included, it is likely that pro-environmental practices are generally interpreted as behaviors that require some degree of self-sacrifice for the sake of the group or the environment. This is supported by correlational evidence which finds that self-transcendence values, which emphasize transcending concerns for the self in favor of concern for others or for greater principles, consistently, positively predict willingness to engage in pro-environmental behaviors (Ghazali et al., 2019; Hansla et al., 2008; Liobikiene & Juknys, 2016; Nordlund & Garvill, 2002, 2003; Poortinga et al., 2004). On the other hand, self-enhancement values, which emphasize a concern for achieving self-related goals, negatively predict endorsement of pro-environmental behaviors (Nordlund & Garvill, 2002; Poortinga et al., 2004).

This is a potential area for improvement because using a framing that indicates people have to subjugate their self-interest to behave pro-environmentally could be less effective on particular individuals, such as those who endorse self-enhancement over self-transcendent values. This is supported by evidence from a study which manipulated whether engaging in energy conservation was framed as helping people to pursue pro-environmental goals (by reducing individual contributions to GHG emissions) or self-enhancing goals (by helping the individual save money) (De Dominicis, Schultz, & Bonaiuto, 2017). In this study, they found that when a pro-environmental framing was used, people who scored high on self-enhancing values reported significantly lower intentions to save energy compared to people who scored high on altruistic values. However, when a self-enhancing framing was used, there was no significant difference between the two groups. Individuals who endorsed self-enhancing values reported similarly high intentions to save energy as individuals who endorsed altruistic values. Similarly, de Groot and Steg (2007) found that, unlike in most studies, endorsement of egoistic values positively predicted attitudes towards building parking facilities that would make it easier to use public transportation. The authors concluded that this was because, unlike many pro-environmental habits, the building of these parking facilities was viewed as being aligned with participants’ self-interest.

These findings demonstrate that, when adopting a pro-environmental behavior is seen as consistent with pursuing one’s self-interest, the behavior can appeal both to people who endorse self-enhancing and self-transcendent values. In the following section, I will explain how a self-enhancing framing is being used to recontextualize reducing one’s consumption as helping individuals to pursue self-interested goals, as well as how the effectiveness of this framing is being compared to the effectiveness of a pro-environmental framing.

The third characteristic that is shared among norm-intervention studies is that they do not attempt to address people’s motivations to engage in environmentally *un*friendly behaviors. Rather, studies aimed at promoting pro-environmental behaviors suggest that people should adopt these behaviors *in spite of* their current desires to do otherwise. For example, in a study aimed at promoting better recycling habits, participants were given weekly information about the recycling behaviors of their neighbors, which established expectations regarding how much recycling was normative in their neighborhood (Schultz, 1999). There was no mention of the factors associated with people’s desire to *not* recycle, like that recycling is seen as confusing and inconvenient (Roy, Berry, & Dempster, 2022), or an attempt to demonstrate how recycling can coexist with, or even helppeople to achieve, their already existing goals. The rationale for this approach seems to be that we can rely on the persuasive appeal of norms, which apply social pressure by demonstrating which behaviors are normative, effective and/or (un)desirable (Cialdini et al., 2006), to override pre-existing motivations.

However, relying only on the influence of group norms to change people’s behaviors could be less effective on people who are less convinced by group pressures to change their habits. Lapinski et al. (2007) found evidence for this possibility in their study in which they aimed to promote conservation behaviors by exposing people to a pro-conservation descriptive norm (“About 90% of people reported taking steps to conserve in the year prior to the study”). They found that group orientation, defined as the degree to which individuals prioritized group goals over individual goals, moderated the effectiveness of the norm intervention. For people low on group orientation, exposure to the descriptive norm *decreased* intentions to conserve compared to when they were not exposed to the norm. This could be because individuals who are low on group orientation are less susceptible to the influence of groups norms (or may even reject acting in accordance with group norms).

Additionally, even among people who are willing to balance the needs of their group with personal desires, exposure to current norm interventions could be creating competing internal motivations. On the one hand, people may be motivated to adopt a pro-environmental behavior to conform with prevailing group norms, but on the other, they could still desire the benefits of engaging in environmentally unfriendly habits. For example, two qualitative studies investigated people’s perception of what barriers prevent them from engaging in more environmentally-friendly behaviors. In studies of recycling behaviors and eco-conscious apparel consumption, even among eco-conscious individuals, there was a limit to how much people said they were willing to self-sacrifice for the sake of achieving group goals (Connell, 2010; Roy et al., 2022). Specifically, people reported that cost and inconvenience were two limiting factors to how much they were willing to engage in these pro-environmental habits.

For these reasons, I propose that norm interventions could be more effective if they communicated how the adoption of a pro-environmental practice is consistent with, or helps people to achieve, their pre-existing goals. In the following section, I will elaborate on what goals seem to motivate people’s consumption behaviors. Then, I will describe how the current project is constructing and testing norm-intervention conditions that communicate how these desired goals can be met by *reducing* one’s consumption.

**Methodological Changes Being Tested in the Current Project**

The first methodological change that is being examined in the current project is the efficacy of a broader range of types of norm conditions. For the current project, the following types of norm-intervention conditions were developed: descriptive norms, conventions, social norms, and moral norms.

To construct each of these norm conditions, I first established a definition of norms based on definitions that have been used before in psychology and sociology. In psychology, norms have been defined as people’s perception of which behaviors are typical or desirable in a particular situation in their group (Miller & Prentice, 1996) and as behavioral rules which guide and/or constrain people’s social behaviors (Cialdini & Trost, 1998). Bicchieri, a researcher who has performed sociological examinations of the nature of rules that exist for guiding people’s behaviors across various societies, expands on this definition of norms to include that they are also upheld by people’s expectations that other members of their group endorse them (Bicchieri, 2007). Based on this previous work, the definition of norms that I am using is *rules that exist in groups regarding which behaviors are appropriate, or inappropriate, to engage in in particular situations where, importantly, these rules are accompanied with and upheld by people’s expectations that the rules are endorsed by other members of their group*.

Based on this definition of norms, norm types can be differentiated in many respects. Norms can be differentiated based on whether they are perceived as being widely followed, whether people perceive that they are expected by others in their group to follow them, whether people perceive that others *prefer* that they follow the norm, whether consequences exist for *failing* to comply with the norm, and whether people perceive the norm as appealing to universal moral principles (Bicchieri, 2006, 2014; Cialdini et al., 1990; Elster, 2011; Hechter, 2018). Currently used norm interventions largely rely on differentiating between norms that describe widely followed behavioral rules (descriptive norms) from behavioral rules that are accompanied by social expectations of compliance (injunctive norms). However, these definitions may still be so broad that they conceal from identification more nuanced types of norms. For this project, I propose using distinct definitions for descriptive norms, conventions, social norms, and moral norms. These definitions are largely based on the extensive sociological examination performed in Bicchieri (2006).

Descriptive norms are rules for behaving a certain way in a particular situation that people perceive as being commonly followed and also expect a sufficient number of other people to conform with (Bicchieri, 2006). People conform with a descriptive norm when they expect a majority of other people to also conform and when they have a preference for behaving in a way that is perceived as normal or effective. For example, new clothing fashions can be seen as descriptive norms. People may begin wearing a new type of clothing if they see that a sufficient number of other people are wearing the new clothing type and if they prefer to wear clothing that is seen by others as normal or fashionable. This overlaps with Cialdini & Goldstein’s (2004) rationale that people conform their behavior to match descriptive norms because they perceive this behavior as being effective or well-adapted to a given situation.

Conventions are rules for behaving a certain way in a particular situation that people perceive as being commonly followed and mutually expect one another to follow (Bicchieri, 2006). This is different from descriptive norms where expectations about who was expected to conform were unilateral; observers of a descriptive norm expect others to conform, but do not feel that other people have strict expectations for the observer to conform as well. For conventions, expectations of compliance are mutual. Observers expect others to comply, and others also expect the observer to comply, with the behavioral rule. Conventions tend to be rules that help people coordinate their behaviors to achieve a mutual goal (Bicchieri, 2006; Hecther, 2018). For example, there is a convention at auctions to raise your hand or sign to make a bid. This is a convention because it is seen as being commonly followed in a particular situation, coordinates people’s behavior to achieve a common goal, and entails mutual expectations of compliance. The attendees at the auction expect anyone interested in making a bid to use the agreed-upon behavioral guideline. Conventions tend to be long-lasting because once a behavior has been established as an effective solution for coordinating people’s behaviors, the convention tends to be self-reinforcing. It is in everyone’s interest who wants to coordinate their behaviors to achieve a common goal to perform the arbitrary behavioral solution.

Social norms are rules for behaving a certain way in a particular situation that people perceive as being commonly followed and believe that others *strongly prefer* one to comply with (Bicchieri, 2006). This is different from conventions which do not include beliefs that others strongly prefer that one comply with the norm. With conventions, there is just an expectation that whoever is interested in coordinating with others during a particular type of interaction will follow the conventions that have been established for doing so. However, social norms are behavioral rules people follow *because* they perceive that others prefer that they follow the rule. For example, there is a social norm in some areas of the United States that people should wait for everyone at the table to be served their food before eating. There is not a goal that is achieved by everyone waiting to eat their food (in fact, some people’s food is getting colder while they wait). It is simply seen as rude to *not* wait for everyone else to be served their food before eating. Another example is a behavioral rule in some parts of the United States against putting one’s elbows on the table during meals. Social norms are often rules that go against people’s self-interest; however, people conform either to avoid negative social repercussions (e.g., ostracism, ridicule) or gain positive social repercussions (e.g., praise, improved status).

Moral norms are rules for behaving a certain way in a particular situation that have many of the characteristics of the previous norms – they are perceived as being widely followed, there are mutual expectations of compliance, people perceive that others *prefer* that they comply with the norm, and transgressions can be met with social consequences – but these rules are also, importantly, moralized (Bicchieri, 2006). By moralized, I mean that the behavior being constrained or endorsed by a rule is discussed in one’s society in terms of the behavior’s moral rightness or wrongness. (I do notmean that the behavior itself is objectively right or wrong based on moral principles, only that a consensus has been established among a group of people on whether to *judge* the behavior as right or wrong). There are many behavioral rules that are justified based on judgments about the morality of the behavior in question. For example, a moral norm exists against causing harm to others in many societies, as does a moral norm against engaging in homosexual behaviors (though there is greater variability between societies in the existence of a moral norm for the latter compared to the former) (Vauclair & Fischer, 2011). These rules carry a different weight and influence over people’s behaviors because they are moralized. Since individuals’ justification for the behavioral rule is that the behavior in question is itself morally right or wrong, people who consider violating the moral norm may anticipate experiencing extreme guilt, and this emotion plays a part in sustaining people’s compliance with the norm (Elster, 2011).

In Table 1, I provide a summary of the definitions for each of the norm constructs described above. These definitions demonstrate the ability to differentiate types of norms that go beyond the descriptive-injunctive norm dichotomy. Additionally, each type of norm is associated with a nuanced reason of why people may feel compelled to conform with the norm. Given that each of these types of norms can be well-defined and that the factors motivating compliance varies between them, it is worth comparing how effective they are as norm-intervention conditions used to promote pro-environmental behaviors. In the methods section, I will elaborate on the specific norm-intervention conditions that were developed for this project based on each of these definitions.

**Table 1**

*Definitions of Types of Norms*

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| --- | --- |
| **Type of Norm** | **Definition** |
| Descriptive Norms | Rules for behaving a certain way that are perceived as being widely followed, but people do not feel they are expected by others to follow these rules |
| Conventions | Rules for behaving a certain way that are perceived as being widely followed, that typically achieve a coordination function, and that people expect one another to comply with; tend to be long-lasting |
| Social Norms | Rules for behaving a certain way that people perceive as being widely followed andbelieve that others *strongly prefer* one to comply with; typically go against one’s self-interest; possible social consequences |
| Moral Norms | Rules for behaving a certain way that are perceived as being widely followed, that people expect one another to comply with, that people believe others *strongly prefer* one to comply with, and that are moralized; tend to have sanctions (external and/or internal) |

In the following sections, I will discuss how using a pro-environmental framing which pits self-interest against interests of the group could be reducing the potential strength of norm interventions. I will also explain how the effectiveness of a self-enhancing framing, which recontextualizes the adoption of a pro-environmental behavior as being consistent with one’s self-interest, is being tested in the current project.

In the following sections, I will elaborate on what social goals motivate people’s consumption behaviors and how the current project is testing the efficacy of norm-intervention conditions that communicate how these desired social goals can be met by *reducing* one’s level of consumption.