

The definitive version of:

Nolan, J. M., (2021). Social norm interventions as a tool for pro-climate change. *Current Opinion in Psychology: Special Issue on Psychology of Climate Change*, 42, 120-125.

Is available at: <https://www.sciencedirect.com/science/article/pii/S2352250X21000701>

Social norm interventions as a tool for pro-climate change

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Word count: 2,870

References: 56

Keywords: Social norms, climate change, second order beliefs, energy conservation

Abstract

Social norms interventions are a robust and widely used tool for addressing climate change. Social norms interventions targeting second order climate beliefs can be used to correct normative misperceptions, close the partisan gap, and increase support for climate policy. Social norms interventions can also be harnessed to reduce greenhouse gas emissions by targeting behaviors like home energy conservation. A large body of current research confirms the effectiveness of the social norms intervention and provides guidance for how to optimize outreach and promote climate-relevant behaviors that are currently performed by less than a majority of people.

Social norm interventions as a tool for pro-climate change

A little over ten years ago social norms interventions (SNIs), were cited as an “underestimated and underemployed” lever for managing climate change (Griskevicius et al. 2008). Today, scholars describe the SNI or “norm-nudge” as popular and widespread (Bicchieri & Dimant, 2019) and multiple meta-analyses confirm the overall effectiveness of this approach, in general (Rhodes et al., 2020), as well as for addressing climate change specifically (Abrahamse & Steg, 2013; Andor & Fels, 2018; Farrow et al., 2017). Social norms are defined as “rules and standards that are understood by members of a group, and that guide morally relevant social behavior by way of social sanctions, instead of the force of laws” (Nolan, 2017a). In a typical SNI, people are provided with information about beliefs and behaviors that are common and/or approved as a way to correct misperceptions and motivate changes in behavior.

In this essay I argue that SNIs can be widely applied to promote pro-climate beliefs, behaviors, and policy support. Targeting beliefs about what others believe and do makes sense because individual contributions to solve climate change will be futile if not enough others are willing to take action. I focus on the role of second-order beliefs (beliefs about what others believe) and ways in which standard SNIs can be designed to optimize effectiveness and address desired climate actions that are currently only practiced by a minority of people.

Climate change beliefs and second-order beliefs

More than two-thirds of Americans believe that global warming is happening and more than half believe that it is human-caused (Lieserowitz et al., 2019). However, second-order climate beliefs about the general public are systematically underestimated. For example, when asked to estimate the percentage of the U.S. population who agree with statements about climate change, both “believers” and “non-believers” underestimate the public consensus (Mildenberger

& Tingley, 2017). This tendency to underestimate public consensus was also observed among U.S. congressional staffers and international relations scholars. These incorrect second-order beliefs may be fueling the partisan gap in climate change beliefs and exacerbating the perception of political polarization around climate policies. Both Democrats and Republicans underestimate a) the percentage of Republicans (a majority) who believe in and are concerned about climate change and b) the extent to which members of each party will support climate policies proposed by the opposing side (Van Boven et al., 2018).

The systematic underestimation of the extent to which the public believes in climate change and supports policy action is important because these second-order beliefs are correlated with an individual's own pro-climate beliefs, behaviors, and policy support. For example, those who perceive that a majority of their friends and family believe in climate change are more likely to believe in climate change themselves and support regulating carbon dioxide (Goldberg et al., 2020). Furthermore, while liberals do express greater concern compared to conservatives, this partisan gap was much smaller among conservatives and liberals who perceived that there was a pro-climate consensus among their friends and family (Goldberg et al., 2020). Second-order climate beliefs can also affect self-reported behavior. For example, students who believe in climate change themselves were still relatively unwilling to discuss it with their peers when they perceived that most other students were unconcerned (Geiger & Swim, 2016). Similarly, participants who perceived that holding biospheric values was not "typical" for an American or a fellow partisan self-reported lower past efforts and future willingness to save energy and this effect was more pronounced for those who were strongly identified with the reference group (Bouman et al., 2020).

SNIs targeting second-order beliefs via messaging or by manipulating the observed environment can correct normative misperceptions. For example, both liberals and conservatives who were told that “97% of climate scientists have concluded that human-caused global warming is happening” subsequently increased their estimates of the scientific consensus (van der Linden et al., 2018). Similarly, participants who observed that a climate change video on social media had over a million views perceived climate change to be a more salient issue for “most Americans” compared to those who watched the same video but believed it had only been viewed a few hundred times (Spartz et al., 2015). Correcting second-order climate beliefs also lead to greater willingness, among those already concerned about climate change, to discuss it with their peers when given the opportunity (Geiger & Swim, 2016). Correcting second-order beliefs may also enhance support for international pro-climate policy-making. For example, providing U.S. citizens with normative information indicating that “98% of the Chinese population believes that global warming is happening” increased second-order beliefs about China meeting its carbon reduction goals which then increased citizen support for the U.S. signing an ambitious pro-climate treaty with China (Mildenberger & Tingley, 2017).

Overall, these findings have practical implications for further reducing the partisan gap and increasing support for climate policies. First, second-order beliefs about climate change can be used to identify conservatives (approximately 35% nationally) who may be more willing to take action on climate change (Goldberg et al., 2020). Second, non-believers (including some conservatives) can be targeted for SNIs that provide accurate information about the true percentage of Americans (and conservatives) who hold pro-climate beliefs as a way to indirectly increase support for pro-climate policies.

Normative beliefs predict climate-related behaviors

Correlational research shows that normative beliefs predict a variety of climate-related behaviors. Meta-analytic work shows that normative beliefs about the extent to which others buy or approve of buying alternative fuel vehicles (AFVs), perceiving that peers have a positive opinion of AFVs, and the presence of AFVs in one's neighborhood all predicted an individual's willingness to purchase an AFV (Pettifor et al., 2017). These results held across 11 countries, although effect sizes did vary. Similarly, normative beliefs about the extent to which other people engaged in public-sphere climate actions, such as voting and contacting government officials, was positively correlated with self-reported engagement in those same actions among Vermont residents identified as being "alarmed" about climate change (Doherty & Webler, 2016). Last, descriptive normative beliefs about the extent to which other people were engaging in adaptive actions were positively correlated with adaptive behaviors such as purchasing flood insurance and being willing to evacuate during a hurricane (van Valkengoed & Steg, 2019). Although, SNIs, have primarily been used to address behaviors, like household energy consumption, this correlational research suggests that these additional climate behaviors may be ripe for change via a SNI.

Saving energy with norm-based home energy reports

Foundational research on SNIs has shown that providing households with information about the percentage of people engaging in energy-saving behaviors (Nolan et al., 2008), or with feedback comparing individual energy consumption to a group average (Schultz et al., 2007), can effectively decrease home energy usage. The latter approach has been adapted by companies like Opower and incorporated into home energy reports (HERs) that provide households with graphic feedback about their individual energy consumption as compared to their neighbors and their "efficient neighbors" along with specific tips for saving energy. Evaluation of these large-

scale implementations shows monthly energy savings of between 1 to 2 percent (Allcott, 2011). Although these savings might seem small, it is estimated that norm-based HERs, employed by over 100 utilities worldwide, collectively save 5 trillion watts per hour per year (Nolan et al., 2021). The power of SNIs even extends to individuals who don't pay for their own electricity (Bator et al., 2019) and can decrease energy consumption among both liberals and conservatives, although liberals do show a more pronounced reduction (2.4% vs. 1.7% respectively; Costa & Kahn, 2013). The effects of these interventions seem to be persistent and long-lasting (Allcott & Rogers, 2014) and provide an excellent return on investment compared to other types of non-price interventions (Benartzi et al., 2017).

The long-term effects of SNIs seems to be the result of both new curtailment habits being established, such as turning off unused lights (Delmas & Lessem, 2014), along with adoption of energy efficient technologies. In one study, households that received a norm-based HER showed an 11% increase in the probability of obtaining a rebate from the utility for purchasing an energy-efficient appliance, suggesting a positive spillover effect (Costa & Kahn, 2013). SNIs directly targeting adoption of energy-efficient devices such as home heating pumps have also been successful (Hafner et al., 2019). Long-term savings have also been found for SNIs targeting home water consumption, even after just a single exposure to comparative feedback (Ferraro, Miranda, & Price, 2011).

SNIs employing comparative feedback, like that used in norm-based HERs, can be enhanced in a variety of ways to optimize effectiveness. First, adding an injunctive norm component can help to buffer conformity to the more wasteful group norm for those who consume at below-average levels (Schultz et al., 2007) and provide an extra push for above-average consumers (Bhanot, 2018). Injunctive norms can be operationalized using an emoji or a

written expression of approval/disapproval (e.g., Schultz et al 2007) or by providing information about the percentage of people who approve of a specific behavior or conservation more generally (Bhanot, 2018). Second, for below-average users, combining comparative feedback with information about the *percentage* of people who engage in conservation can also buffer against conformity to a higher group norm (Bonan et al., 2020). Third, targeting second-order normative beliefs can correct normative misperceptions about the extent to which others value saving energy, which can then reduce energy consumption (Jachimowicz et al., 2018). Fourth, making feedback public can be particularly effective in congregate settings such as dormitories where individuals do not pay for their energy consumption but might be motivated to maintain their reputation as someone who cares about the environment (Delmas & Lessen, 2014).

Other applications of the social norms intervention

Of course, social norms can also be activated outside of HERs. Comparative feedback can be provided, with similar effects, via an in-home smart-meter that displays the household's electricity consumption compared to "similar households" and uses colored lights to serve as the injunctive norm (Schultz et al., 2015). Social norms can also be conveyed by manipulating the physical environment (Cialdini et al., 1990). For example, people are more likely to turn off the lights in a public place when the light is off when they arrive (Dwyer et al., 2015) and males may be more sensitive to these visual cues compared to females (Leoniak & Cwalina, 2019). The frequency of turning the lights off when the light was already off can be further increased by adding a prompt that contrasts prescriptive text ("please turn the lights off!") with a proscriptive picture (thumbs down plus sad face), or vice-versa (Bergquist & Nilsson, 2016).

Several strategies may help to optimize the effects of SNIs generally. First, focus on what people avoid or don't do, particularly if there is an obvious climate friendly alternative

(Bergquist & Nilsson, 2019). Second, activate the collective self by using “we” instead of “you” in messaging (White & Simpson, 2013) and focus attention on working together toward a common goal (Howe et al, in press). Third, allow individuals to choose from among several conservation options the one that best fits their lifestyle (Reynolds-Tylus et al., 2019).

Unsustainable behaviors like driving and eating meat are often the norm (Sparkman et al., 2020), so, how can SNIs be used to promote climate friendly alternatives? One option, for non-normative behaviors like installing solar panels, is to target outreach in areas that already have a large number of adopters. For example, are more likely to install solar panels themselves when they live in a zip code with a relatively large number of solar panels already installed (Bollinger & Gillingham, 2012). It might also be helpful to choose someone who “practices what they preach” as the face of the outreach campaign (Kraft-Todd et al., 2018). Another option is to use positive polarity verbal quantifiers (e.g., at least, more than, many) that will encourage people to think about why people engage in a specific behavior or to make a behavior seem more common by framing it within a larger sphere of related behaviors (Demarque et al., 2015). Lastly, when only a minority of people engage in the desired behavior, a dynamic norm that communicates the upward trend of the desired behavior can be employed either in addition to the static minority norm (Mortensen et al., 2017) or on its own (Sparkman & Walton, 2017). Dynamic norms (e.g., “in recent years, 3 in 10 people have changed their behavior and begun to eat less meat”) have been used to increase purchase of meatless meals (Sparkman & Walton, 2017) and to decrease water consumption (Mortensen et al., 2017; Sparkman & Walton, 2017). Further analysis shows that the effect of dynamic norms is driven, in part, by participants’ anticipation of the behavior increasing into the future (Sparkman & Walton, 2017). Additional research outside the context of climate change also shows that dynamic norms increase individual feelings of self-efficacy, their

belief that the behavior is valued by important others, and that change is compatible with their social identity (Sparkman & Walton, 2019). It should also be noted that communicating minority norms can sometimes be effective, but only if the person's past behavior satisfied the norm and they are motivated to be consistent (Lalot et al, 2018).

SNIs can also be used to increase support for climate policies. Across participants in four different countries, support for a climate treaty and the willingness to pay for it increased as the number of countries reported to be participating increased (Bechtel et al., 2019). Meta-analytic research shows that public support for climate policy is the best predictor of city's adopting local climate policies (Yeganeh et al., 2020). Conversely, policies can be used to change or buttress conservation norms (Kinzig et al., 2013). For example, in towns that had a mandatory recycling ordinance or a pay-per-bag program, residents felt guiltier when they didn't recycle and expressed more disapproval for non-recycling neighbors compared to those who lived in towns with voluntary recycling programs (Nolan, 2017). Similarly, combining information about steps the government was taking to offset carbon emissions with a testimonial claiming that many individuals were also doing so voluntarily increased voluntary carbon offsets among participants (Huber et al., 2018). Thus, policies can help to change and support social norms and vice versa (Nyborg et al., 2016).

Climate change is a global problem with global causes and global ramifications and so generalizability of SNIs across cultures must be explored. SNIs for climate change have been found to be effective across cultures, although effect sizes do vary. For example, compared to the United States, effect sizes in Europe are smaller (Bonan et al., 2020) and some have argued that SNIs for home energy consumption are unlikely to be cost-effective there (Andor & Fels, 2018). While one meta-analysis of SNIs targeting a broad range of behaviors found that they

are more effective in collectivistic countries in Asia and Latin America (Rhodes et al., 2020), another meta-analysis looking specifically at field experiments promoting environmental behavior found SNIs had a stronger effect in more individualistic countries (Bergquist et al., 2019). This result may be especially noteworthy given that individualistic countries are less willing to pay to support costly climate policies (Alló & Loureiro, 2014).

Concerns about social norms interventions

Normative feedback may not always be well received by the target audience. More than a third of households surveyed in one study said they disliked the norm-based HER and 2% took action not to receive it (Costa & Kahn, 2013). Further analysis showed that high energy users and conservatives were more likely to dislike the reports and to opt out of receiving them. Households reacted even more negatively to normative feedback provided by smart meters with 23% choosing to return the meter at the end of the study compared to only 13% of those who received individual feedback (Schultz et al., 2015). In addition, SNIs may lead to negative spillover for non-targeted behaviors. That is, a SNI successfully targeting one behavior, such as water consumption, may lead to an increase in energy consumption during the same time period (Andor & Fels, 2018).

Conclusion

Social norms interventions are a robust tool for addressing climate change. The effects of SNIs persist over time and generalize across behaviors and cultures. SNIs targeting second-order normative beliefs can be used to reduce the partisan gap in climate change beliefs domestically and increase support for climate cooperation internationally. SNIs can encourage individual level changes in behaviors such as energy and water consumption using comparative feedback or behaviors such as turning off the lights by manipulating the observed environment. SNIs can be

optimized by following the best practices for design outlined in this and other reviews (Nolan et al 2021). Dynamic norms present an especially promising approach for adapting the SNI to promote non-normative behaviors. SNIs can be a particularly effective tool for addressing climate change if they are leveraged not just to change individual behavior but also support for structural solutions. As a large-scale social dilemma, the climate crisis presents many barriers to action, not the least of which is uncertainty about the behavior of others. SNIs provide a way to reduce this social uncertainty and assure individuals that they are not alone in their beliefs or efforts to combat climate change.

References

- Abrahamse, W., & Steg, L. (2013). Social influence approaches to encourage resource conservation: A meta-analysis. *Global environmental change*, 23(6), 1773-1785.
- Allcott, H. (2011). Social norms and energy conservation. *Journal of public Economics*, 95(9-10), 1082-1095.
- Allcott, H., & Rogers, T. (2014). The short-run and long-run effects of behavioral interventions: Experimental evidence from energy conservation. *American Economic Review*, 104(10), 3003-37.
- Alló, M., & Loureiro, M. L. (2014). The role of social norms on preferences towards climate change policies: A meta-analysis. *Energy Policy*, 73, 563-574. [ILL]
- *Andor, M. A., & Fels, K. M. (2018). Behavioral economics and energy conservation—a systematic review of non-price interventions and their causal effects. *Ecological Economics*, 148, 178-210.
- *This paper provides a systematic review of four types of behavioral interventions to promote energy conservation: social comparison, commitment devices, goal setting, and labeling. Possible unintended side-effects and cross-cultural limitations are noted.
- Bator, R. J., Phelps, K., Tabanico, J., Schultz, P. W., & Walton, M. L. (2019). When it is not about the money: Social comparison and energy conservation among residents who do not pay for electricity. *Energy Research & Social Science*, 56, 101198.
- Bechtel, M. M., Genovese, F., & Scheve, K. F. (2019). Interests, norms and support for the provision of global public goods: the case of climate co-operation. *British journal of political science*, 49(4), 1333-1355.

Benartzi, S., Beshears, J., Milkman, K. L., Sunstein, C. R., Thaler, R. H., Shankar, M., ... & Galing, S. (2017). Should governments invest more in nudging?. *Psychological science*, 28(8), 1041-1055.

Bergquist, M., & Nilsson, A. (2016). I saw the sign: promoting energy conservation via normative prompts. *Journal of Environmental Psychology*, 46, 23-31.

Bergquist, M., & Nilsson, A. (2019). The DOs and DON'Ts in social norms: A descriptive don't-norm increases conformity. *Journal of Theoretical Social Psychology*, 3(3), 158-166.

*Bergquist, M., Nilsson, A., & Schultz, W. P. (2019). A meta-analysis of field-experiments using social norms to promote pro-environmental behaviors. *Global Environmental Change*, 59, 101941.

*Meta-analysis focused specifically on field experiments that have utilized social norms to promote pro-environmental behaviors, including energy conservation. Results across 74 studies show that social norms interventions in the field have an average effect size of $d = 0.32$ and that they are more effective when delivered subtly and in individualistic countries.

*Bhanot, S. P. (2018). Isolating the effect of injunctive norms on conservation behavior: New evidence from a field experiment in California. *Organizational Behavior and Human Decision Processes*.

*Explores the effects of an injunctive norm component in home water reports. Consistent with past research, this study shows that comparative feedback is most effective at reducing consumption among above-average users. However, closer inspection shows that households that consume the most water are less responsive to treatment compared to those who are closer to the group average. Engagement with the home water reports is measured and analyzed and shows no difference across conditions.

- Bicchieri, C., & Dimant, E. (2019). Nudging with care: The risks and benefits of social information. *Public choice*, 1-22.
- Bollinger, B., & Gillingham, K. (2012). Peer effects in the diffusion of solar photovoltaic panels. *Marketing Science*, 31(6), 900-912.
- Bonan, J., Cattaneo, C., d'Adda, G., & Tavoni, M. (2020). The interaction of descriptive and injunctive social norms in promoting energy conservation. *Nature Energy*, 5(11), 900-909.
- Bouman, T., Steg, L., & Zawadzki, S. J. (2020). The value of what others value: When perceived biospheric group values influence individuals' pro-environmental engagement. *Journal of Environmental Psychology*, 71, 101470.
- Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: recycling the concept of norms to reduce littering in public places. *Journal of personality and social psychology*, 58(6), 1015.
- Costa, D. L., & Kahn, M. E. (2013). Energy conservation "nudges" and environmentalist ideology: Evidence from a randomized residential electricity field experiment. *Journal of the European Economic Association*, 11(3), 680-702.
- Delmas, M. A., & Lessem, N. (2014). Saving power to conserve your reputation? The effectiveness of private versus public information. *Journal of Environmental Economics and Management*, 67(3), 353-370.
- Demarque, C., Charalambides, L., Hilton, D. J., & Waroquier, L. (2015). Nudging sustainable consumption: The use of descriptive norms to promote a minority behavior in a realistic online shopping environment. *Journal of Environmental Psychology*, 43, 166-174.
- Doherty, K. L., & Webler, T. N. (2016). Social norms and efficacy beliefs drive the alarmed segment's public-sphere climate actions. *Nature Climate Change*, 6(9), 879-884.

- Dwyer, P. C., Maki, A., & Rothman, A. J. (2015). Promoting energy conservation behavior in public settings: The influence of social norms and personal responsibility. *Journal of Environmental Psychology, 41*, 30-34.
- Farrow, K., Grolleau, G., & Ibanez, L. (2017). Social norms and pro-environmental behavior: A review of the evidence. *Ecological Economics, 140*, 1-13.
- Ferraro, P. J., Miranda, J. J., & Price, M. K. (2011). The persistence of treatment effects with norm-based policy instruments: evidence from a randomized environmental policy experiment. *American Economic Review, 101*(3), 318-22.
- Geiger, N., & Swim, J. K. (2016). Climate of silence: Pluralistic ignorance as a barrier to climate change discussion. *Journal of Environmental Psychology, 47*, 79-90.
- Goldberg, M. H., van der Linden, S., Leiserowitz, A., & Maibach, E. (2020). Perceived social consensus can reduce ideological biases on climate change. *Environment and Behavior, 52*(5), 495-517.
- Griskevicius, V., Cialdini, R. B., & Goldstein, N. J. (2008). Social norms: An underestimated and underemployed lever for managing climate change. In *In*.
- Hafner, R., Elmes, D., Read, D., & White, M. P. (2019). Exploring the role of normative, financial and environmental information in promoting uptake of energy efficient technologies. *Journal of Environmental Psychology, 63*, 26-35.
- Huber, R. A., Anderson, B., & Bernauer, T. (2018). Can social norm interventions promote voluntary pro-environmental action? *Environmental science & policy, 89*, 231-246. [ILL]
- Jachimowicz, J. M., Hauser, O. P., O'Brien, J. D., Sherman, E., & Galinsky, A. D. (2018). The critical role of second-order normative beliefs in predicting energy conservation. *Nature Human Behaviour, 2*(10), 757-764.

Kinzig, A. P., Ehrlich, P. R., Alston, L. J., Arrow, K., Barrett, S., Buchman, T. G., ... & Ostrom, E. (2013). Social norms and global environmental challenges: the complex interaction of behaviors, values, and policy. *BioScience*, *63*(3), 164-175.

Kraft-Todd, G. T., Bollinger, B., Gillingham, K., Lamp, S., & Rand, D. G. (2018). Credibility-enhancing displays promote the provision of non-normative public goods. *Nature*, *563*(7730), 245-248.

Lalot, F., Falomir-Pichastor, J. M., & Quiamzade, A. (2018). Compensation and consistency effects in proenvironmental behaviour: The moderating role of majority and minority support for proenvironmental values. *Group Processes & Intergroup Relations*, *21*(3), 403-421.

Leiserowitz, A., Maibach, E. W., Rosenthal, S., Kotcher, J., Bergquist, P., Ballew, M., ... & Gustafson, A. (2019). Climate change in the American mind: April 2019. *Yale University and George Mason University. New Haven, CT: Yale Program on Climate Change Communication*.

Leoniak, K. J., & Cwalina, W. (2019). The role of normative prompts and norm support cues in promoting light-switching behavior: a field study. *Journal of Environmental Psychology*, *64*, 1-11.

*Mildenberger, M., & Tingley, D. (2017). Beliefs about climate beliefs: the importance of second-order opinions for climate politics. *British Journal of Political Science*, *49*(4), 1279-307.

*Provides a comprehensive examination of second order climate beliefs held by Chinese and American populations as well as international relations scholars and U.S. legislative staff.

Establish that both Chinese and American publics' underestimate the true percentage of their own and the other's population that believes in climate change. Results from a survey

research experiment with a large representative sample showed that second order beliefs about the Chinese public could be shifted among members of the American public and that this shift lead to greater support for an international climate treaty.

- Mortensen, C. R., Neel, R., Cialdini, R. B., Jaeger, C. M., Jacobson, R. P., & Ringel, M. M. (2017). Trending norms: A lever for encouraging behaviors performed by the minority. *Social Psychological and Personality Science*, 1948550617734615.
- Nolan, J. M. (2017a). Social Norms and their Enforcement. In S. Harkins and K. Williams (Eds.) *Oxford Handbook of Social Influence*. Oxford University Press.
- Nolan, J. M. (2017b). Environmental policies can buttress conservation norms. *Society & Natural Resources*, 30(2), 228-244.
- Nolan, J. M., Schultz, P. W., Cialdini, R. B., & Goldstein, N. J. (2021). The Social Norms Approach: A Wise Intervention for Solving Social and Environmental Problems. In G. Walton and A. Crum (Eds.) *Handbook of Wise Interventions*. Guilford.
- Nolan, J. M., Schultz, P. W., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2008). Normative social influence is underdetected. *Personality and Social Psychology Bulletin*, 34(7), 913-923.
- Nyborg, K., Anderies, J. M., Dannenberg, A., Lindahl, T., Schill, C., Schlüter, M., ... & Chapin, F. S. (2016). Social norms as solutions. *Science*, 354(6308), 42-43.
- Pettifor, H., Wilson, C., Axsen, J., Abrahamse, W., & Anable, J. (2017). Social influence in the global diffusion of alternative fuel vehicles—a meta-analysis. *Journal of Transport Geography*, 62, 247-261.

- Reynolds-Tylus, T., Martinez Gonzalez, A., & Quick, B. L. (2019). The role of choice clustering and descriptive norms in attenuating psychological reactance to water and energy conservation messages. *Environmental Communication, 13*(7), 847-863.
- Rhodes, N., Shulman, H. C., & McClaran, N. (2020). Changing Norms: A Meta-Analytic Integration of Research on Social Norms Appeals. *Human Communication Research, 46*(2-3), 161-191.
- Schultz, P. W., Estrada, M., Schmitt, J., Sokoloski, R., & Silva-Send, N. (2015). Using in-home displays to provide smart meter feedback about household electricity consumption: A randomized control trial comparing kilowatts, cost, and social norms. *Energy, 90*, 351-358.
- Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The constructive, destructive, and reconstructive power of social norms. *Psychological science, 18*(5), 429-434.
- Sparkman, G., & Walton, G. M. (2017). Dynamic norms promote sustainable behavior, even if it is counternormative. *Psychological science, 28*(11), 1663-1674.
- Sparkman, G., & Walton, G. M. (2019). Witnessing change: Dynamic norms help resolve diverse barriers to personal change. *Journal of Experimental Social Psychology, 82*, 238-252.
- *Sparkman, G., Howe, L., & Walton, G. (2020). How social norms are often a barrier to addressing climate change but can be part of the solution. *Behavioural Public Policy, 1-28*.
- *Excellent overview of research on dynamic and working together norms and their underlying motivations. The authors argue that unsustainable behaviors are often the norm but that both types of norms can be used, alone or together, to promote climate solutions.

- Spartz, J. T., Su, L. Y. F., Griffin, R., Brossard, D., & Dunwoody, S. (2017). YouTube, social norms and perceived salience of climate change in the American mind. *Environmental Communication, 11*(1), 1-16.
- Van Boven, L., Ehret, P. J., & Sherman, D. K. (2018). Psychological barriers to bipartisan public support for climate policy. *Perspectives on Psychological Science, 13*(4), 492-507.
- van der Linden, S., Leiserowitz, A., & Maibach, E. (2018). Scientific agreement can neutralize politicization of facts. *Nature Human Behaviour, 2*(1), 2-3.
- van Valkengoed, A. M., & Steg, L. (2019). Meta-analyses of factors motivating climate change adaptation behaviour. *Nature Climate Change, 9*(2), 158-163.
- White, K., & Simpson, B. (2013). When do (and don't) normative appeals influence sustainable consumer behaviors? *Journal of Marketing, 77*(2), 78-95.
- Yeganeh, A. J., McCoy, A. P., & Schenk, T. (2020). Determinants of climate change policy adoption: A meta-analysis. *Urban Climate, 31*, 100547.