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Social Norms and Pro-environmental Behavior: A Review of the Evidence

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ABSTRACT

In light of the growing attention that social norm interventions have garnered as policy tools, we review the current body of evidence on their effectiveness with respect to pro-environmental behaviors. We identify the various conceptualizations of social norms currently in use and inventory the experimental economics and social psychology literature that has examined the impacts of social norm interventions on pro-environmental behavior. For each study included in this inventory, we note several contextual features, the data collection and analytical methods used, and any significant main effects attributed to the social norm intervention. We also review several theoretical models of behavior that incorporate social norms. Based on this empirical and theoretical review, we draw a number of policy implications and identify avenues for future research on the role of social norms with respect to pro-environmental behavior.

Contents

1. Introduction

A vast body of evidence demonstrates that social norms impact a wide range of behaviors, including conservation activities, charitable donations, alcohol consumption, and diet and exercise habits. According to this research, it appears that what other people do and think matters a great deal to individuals, and moreover, that social norm dynamics can have important implications for societal outcomes (Nyborg et al., 2016). Social information can affect individuals for a variety of reasons: people may wish to fit in (or on the contrary, stand out), avoid social disapproval, or seek social esteem. People may also take the behavior of others as an indication of what is most effective, or they may expect reciprocity in exchange for their own conformity. Paradoxically, despite the many reasons why people may follow social norms, it has also been shown that people tend to underestimate the influence of norms on their own behavior (Cialdini, 2007). Findings such as these indicate that social norms tend to operate through fast, intuitive, and emotional mental heuristics. What's more, emerging evidence also points to the possibility that the importance of social norms with respect to behavior has been underestimated by the research community in the past, as well. Indeed, social norms have been found to be responsible for some of the explanatory power previously attributed to elements in the Theory

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of Planned Behavior (Thøgersen, 2014) and have also been found to explain some of the effectiveness of the default option framing bias (Everett et al., 2015).

While the study of norms originated in sociology, over time it has also come to be emphasized in a variety of domains ranging from neuroscience and business ethics to public health. Along with the recent import of many psychological insights into the field of economics, social norms have increasingly become of interest to economists, as well. In this review, we draw from work in social psychology and economics, and as such, we treat conformity to social norms from the individualistic perspective of these disciplines. Opp (1979) provides an early comparison of how economics and psychology approach the study of social norms, suggesting that hypotheses from both disciplines can complement each other in advancing the body of knowledge on the subject. This complementarity is apparent given that economic theories tend to excel in generalizability, while psychological theories tend to excel in explanatory power. He notes that although the "structural-individualistic" approach employed in economics (i.e. expected utility theory) requires some assumptions, it permits researchers to state very specific hypotheses regarding the conditions for conformity to social norms, and thus constitutes a powerful method by which hypotheses from social psychology can also be tested. Additionally, he notes that whereas social norm theories in social psychology address both the information-norm relationship (that is, the psychological process of the formation of norms) as well as the norm-behavior relationship, economic theories are limited to addressing the latter, as expected utility theory explains actions, not motives (Opp, 1979). We note, however, that the methodological developments that have been made in experimental economics in recent years have improved the capacity of economics to address the motivational elements that underlie behavior.

Because social norms are implicated in such a wide range of behaviors, it is hardly surprising that they have become the subject of attention by scholars in such diverse domains. In this paper we synthesize common definitions, inventory empirical findings on the effect of social norms on pro-environmental behaviors, and review several theories that incorporate social norms as determinants of individual behavior. In light of this empirical and theoretical review, we derive practical implications for policy-making and offer some useful directions for future research. The aim of this paper is to bring together disparate elements of previous literature in order to reach a more holistic picture of the importance of social norms in pro-environmental behaviors. As a whole, research in the area demonstrates that social norms have significant impacts on behavior and that the degree of these impacts may be affected by a variety of factors including characteristics pertaining to the individual, the norm evoked, the implied reference group, and the social and environmental context in which the decision takes place.

2. Definitions

Social norms have been used to refer both to common behaviors themselves, as well as to the beliefs that support conformity to these behaviors. In most of the recent literature, however, social norms are generally understood to be shared rules of conduct that are partly sustained by approval and disapproval (Elster, 1989). They have been described as the widespread convergence of the "unplanned, unexpected result of individuals' interactions…that specify what is acceptable and what is not in a society or group" (Bicchieri and Muldoon, 2014), as well as "the unwritten codes and informal understandings that define what we expect of others and what others expect of us" (Young, 2015). While some authors identify laws and codes as explicit norms, and unwritten social rules as implicit norms, most consider social norms to be inherently implicit, which places legal and other explicitly codified social frameworks outside of the category of social norms. Purely social norms can also be distinguished from moral and personal norms by the fact that social norms are not followed unconditionally. Instead, people conform to social norms only if certain conditions, such as observability and normative expectations, are met. Social norms have also been distinguished from habits, conventions, and legal rules because they pertain to public (vs. private) action, are rarely in the interest of the individuals who conform, and are not the product of deliberate planning, respectively (Bicchieri and Muldoon, 2014). According to this definition, social norms are therefore considered to be implicit, conditionally followed, and motivated by external (vs. internal) enforcement.

Proceeding from this general understanding of what constitutes a social norm, the difference between descriptive and injunctive norms is the most prominent and widely utilized distinction. Whereas descriptive norms refer to what most people do, injunctive norms describe what most people approve of doing. A further distinction can be made between personal injunctive norms and non-personal injunctive norms as what one approves of doing and what one believes others approve of doing, respectively. The former is usually referred to simply as a personal norm, whereas the latter is usually referred to as an injunctive norm. As the study of norms has expanded, further classifications have been proposed. Another distinction that has emerged is the difference between perceived and actual norms, where a perceived norm refers to an individual's subjective belief about the actual descriptive or injunctive social norm. Perceived descriptive and injunctive norms have also been referred to as empirical and normative expectations (Bicchieri and Muldoon, 2014). In psychological game theory, these expectations constitute one of the mechanisms through which norms impact behavior.

Another distinction that has been made concerns the prescriptive vs. proscriptive characteristic of a social norm. Whereas prescriptive social norms consist of descriptions of what others do or approve of doing, proscriptive norms are prohibitive in nature, focusing attention on what others do not do (descriptive), or do not approve of doing (injunctive). While both of these norms may encourage the same behavior (e.g. the injunctions "keep the park clean" vs. "do not litter"), some evidence suggests that proscriptive injunctive norms attract more cognitive attention than prescriptive injunctive norms, and that this may account for the greater effectiveness of proscriptive norms (Cialdini et al., 2006). Another possible explanation for this finding could be that the proscriptive statement above implies a specific action (in this case, avoiding littering), whereas the prescriptive statement is less clear about the specific action to be taken ("keeping the park clean," for example, could comprise a variety of specific activities). Further tests of this hypothesis will be needed in order to support the robustness of this result and explore whether such findings apply beyond the context of the study above.

Although descriptive and injunctive norms are distinct concepts, empirical evidence suggests that they are closely psychologically related. Injunctive norms are generally thought to be effective because they signal the likelihood of obtaining social approval or disapproval, and therefore enable individuals to update their expectations regarding the accompanying material and emotional payoffs associated with possible actions. Descriptive norms are thought to be effective by serving as an indicator of both injunctive norms (when there is uncertainty surrounding these) as well as payoff-maximizing behavior. In the latter case, conformity is motivated by adaptive concerns and can be considered an automated cognitive strategy that reduces the calculation costs involved in the decision-making process. Morris et al. (2015) indeed note that people frequently infer what ought to be (injunctive norms) from what is (descriptive norms), and that people may also induce perceived injunctive norms from their own personal norms. We note the additional possibility that people may infer perceived descriptive norms from perceived injunctive norms. Smith et al. (2012)show that the power of each type of norm on behavior depends on the degree to which they are in alignment, and Bicchieri and Xiao (2009) find that when these two norms are in conflict, descriptive norms are predictive of behavior, whereas injunctive norms are only predictive of behavior when they coincide with descriptive norms. Other research indicates that when individuals are under a cognitive load, the influence of descriptive norms on behavior increases while the influence of injunctive norms decreases (Melnyk et al., 2011), which provides support for the

hypothesis that compliance to descriptive norms can constitute a heuristic shortcut that reduces the effort involved in decision-making when cognitive resources are limited. Morris et al. (2015) note that deliberation regarding compliance to injunctive norms is likely to involve strategic considerations concerning social status and material benefit, and is therefore likely to require a greater amount of cognitive effort. Jacobson et al. (2011) find evidence that injunctive norms invoke dual/dueling goals, whereas descriptive norms invoke an accuracy/efficiency goal.

Noting the motivational ambiguity of conventional norm constructs, Thøgersen (2006) proposes an extended taxonomy of social norms that distinguishes between different types of norms based on the degree to which they are internalized. In this framework, the more internalized a norm, the more predictive it is of behavior. The least internalized of these norms are referred to as external descriptive norms, conformity to which is motivated by adaptive concerns. Subjective (i.e. perceived) injunctive norms are more internalized than external descriptive norms, and conformity to these is motivated by the desire to seek (avoid) social approval (disapproval) and any accompanying rewards (sanctions). When an individual has internalized subjective injunctive norms such that conforming to or transgressing a norm causes self-imposed feelings of pride or guilt, the norm is then considered to be superficially internalized, and becomes an introjected personal norm. This type of norm continues to be motivated by pursuit or avoidance of emotional rewards or sanctions, but the enforcement of these consequences arises from oneself as opposed to others. Finally, an integrated personal norm is one that has been internalized to such an extent that it becomes associated with deeply held values and beliefs, and is therefore followed unconditionally. The most notable addition that this taxonomy makes to the established definitions used in social norm research is the notion of an introjected personal norm. Presumably then, the greater the extent to which a norm is introjected, the less important will be factors such as observability and normative expectations in decisions regarding conformity. Throughout the literature on social norms and pro-environmental behaviors, the most widely studied distinctions appear to be injunctive vs. descriptive, and to a lesser extent, perceived vs. actual and prescriptive vs. proscriptive norms. These distinctions are summarized in Table 1.

3. Empirical Results

An abundance of factors have been found to influence the extent to which normative information impacts behavior. These factors generally relate to the characteristics of the individual (e.g. presence of intrinsic motivation,[1] level of cognitive depletion, socio-demographic characteristics, risk tolerance, degree of familiarity with the behavior in question), the characteristics of the norm evoked (e.g. descriptive vs. injunctive, degree of difficulty to conform), the implied reference group (e.g. size, geographical/social/temporal proximity), as well as other elements of the social and environmental context. While some of these factors are generally fixed, others can be manipulated, which offers possible avenues through which policy interventions can leverage the power of social norms in order to achieve environmental objectives.

In the collected works below, we report the general findings of studies examining the impact of social norms on pro-environmental behaviors. These works were collected from Web of Science using several keyword searches: norm* and behavior, norm* and eco*, norm* and environment*, and norm* and prosocial. We selected studies in the fields of economics and social psychology that met the following criteria. First, we selected studies that either experimentally manipulated perceived social norms or elicited perceived norms and examined the extent to which these norms predicted pro-environmental intentions or behavior. Second, we selected studies that implemented a social norm intervention using a message communicating either descriptive or injunctive information (as opposed to studies that make norms salient in other ways, such as manipulating the physical environment). Many of the research questions addressed by these studies are more complex than what we communicate in this summary, examining, for example, the impact of different levels of norms, or various situational or individual factors that moderate the norm-behavior relationship. Because our aim in this review is to gather empirical evidence pertaining to the main effects of social norms on pro-environmental behaviors and intentions, we do not report results relating to moderating and/or mediating variables. We believe that reporting on overall treatment effects is a useful starting place for a more comprehensive meta-analysis on findings that shed light on the mechanisms that may explain the results shown here. In this inventory, we focus on perceived vs. actual and descriptive vs. injunctive norms, as these are distinctions that are most frequently studied in the surveyed literature. We separate studies into three categories pertaining to recycling, energy use, and other miscellaneous environmental behaviors.

Consolidating the above studies yields several observations. From this initial survey we observe that, despite the presence of some non-significant results, social norms appear to have a significant effect on a range of pro-environmental behaviors. The consistency with which descriptive norms impact behavior relative to injunctive norms may be partly due to the fact that, in the absence of injunctive norms, people may assume that widespread behavior is supported by a shared belief that the behavior is also appropriate. The particularly reliable impacts associated with descriptive norm interventions could also arise from differences in how descriptive and injunctive norms are implemented. Whereas descriptive norms consist of quantitative statements about actual behavior, injunctive norms can be communicated in a variety of different ways whose rhetoric and intensity may vary, which makes implementing injunctive norm interventions a less straightforward task.[2] From Table 3 we also observe that while some studies elicit perceived descriptive norms, others furnish actual descriptive norms. This is important to note, since in studies of the first kind the social norm intervention focuses individuals on their own perceptions of descriptive and injunctive norms, while in studies of the second kind the intervention provides individuals with factual information about these norms. While this may seem to be a minor detail, individuals may react to new information that confirms their preconceived normative impressions differently than they react to new information that challenges these impressions. The effect of correcting inaccuracies in perceived norms has been studied extensively in the public health literature regarding alcohol and drug use, for example, but has been given less attention with respect to environmental or prosocial behaviors.

We also observe a noticeable lack of studies that take place in developing countries. If developing countries tend to experience higher levels of environmental degradation and lower levels of environmental preferences relative to developed countries, it seems reasonable to expect that social norms pertaining to pro-environmental behavior may be less motivating in such contexts, if indeed they exist at all. For this reason, the study of similar interventions in the context of developing countries represents an important area of future research with respect to the applicability of the results reviewed here. Culiberg and Elgaaied-Gambier (2016) show that pro-environmental norms can vary across countries, and that these norms can moderate the effect of injunctive norms from significant others in some countries, but not in others. Oreg and Katz-Gerro (2006) furthermore show that the degree to which people are affected by social norms can be contingent on cultural factors. The differences in levels of environmental quality, environmental preferences, and social norm dynamics that may be present in

[1] We consider intrinsic motivation in the sense employed by Deci and Ryan (1985), according to which those who are intrinsically motivated to engage in behavior because it is "inherently interesting or enjoyable" to do so, rather than in order to achieve some outcome associated with the behavior.

[2] We thank an anonymous reviewer for this suggestion.

Table 1
Prominent social norm distinctions.

Type of norm	Descriptions
Descriptive vs. injunctive	How most people behave vs. how most people believe one should behave
Actual vs. perceived	A verified norm vs. a norm that is unverified but believed to be true
Prescriptive vs. proscriptive	Norm emphasizing the appropriateness of desirable behavior vs. norm emphasizing the inappropriateness of undesirable behavior

countries at different stages of development highlight the need for empirical work devoted to the effectiveness of social norm interventions in influencing environmental outcomes in these contexts.

What is not evident in the main effects as they are reported here are several important disaggregated findings, such as boomerang effects among outperformers of the norm. We discuss these more nuanced findings as they pertain to policy design in Section 5. Given that the analyses cited above do not control for all of the same variables, the regularities we observe provide strong evidence of the general importance of social norms as determinants of intentions and behavior, but leave unaddressed the question of *how* social norms impact these behaviors. In the next section, we review several theoretical models of behavior that incorporate social norms.

4. Theories of Conformity

Given ample evidence of the effect of norms on behavior, we examine the mechanisms that have been proposed to explain these effects. The first part of this section outlines prominent theoretical models in the social psychology literature, and the second part presents several models that have been developed in the economics literature. We review theories from both approaches to social norms, and compare them from the perspective of the "structural-individualistic" approach taken in economics.

4.1. Social Psychology

One of the most prominent theories that incorporates social norms in the social psychological literature is the Theory of Planned Behavior (Ajzen, 1991). White et al. (2009) describe three different approaches to the inclusion of social norms in the Theory of Planned Behavior. The original theory considers behavior to be dependent on behavioral intentions and perceived behavioral control. Behavioral intentions, in turn, are determined by the combination of perceived behavioral control, attitudes towards the behavior, and subjective norms (i.e. perceived injunctive norms). In the first approach, two types of norms are added: perceived descriptive norms and personal norms (which seem to encompass both Thøgersen's introjected and internalized personal norms). In addition to descriptive and personal norms, the second approach incorporates individual differences in attitudinal and normative control. An individual is said to be under attitudinal control when deliberation about behavior weighs primarily on his own attitudes towards the behavior, whereas an individual is said to be under normative control when deliberation weighs more heavily on normative considerations (what he perceives others think and do). The third approach adds to the original Theory of Planned Behavior individual differences in social identity through the inclusion of group-specific norms and the degree to which one identifies with the relevant group. Using survey data, White et al. (2009) find weak support for the first approach (added norms), no evidence for the second approach (attitudinal and normative control), and strong evidence for the third approach (social identity), which showed considerable explanatory power regarding intentions to recycle.

Another established theory in social psychology is the Focus Theory of Normative Conduct (Cialdini et al., 1990), according to which norms are only likely to influence behavior when they are made salient during the decision-making process. Cialdini and Goldstein (2004) cite three main motivations for conformity: accuracy, affiliation, and positive self-image, noting that in general "people have a strong need to enhance their self-concepts by behaving consistently with their actions, statements, commitments, beliefs, and self-ascribed traits." They also suggest that the degree to which self-image concerns impact an individual's pursuit of conformity depends on the Preference for Consistency Scale, a measure of the strength of an individual's preference for consistency.

Lapinski and Rimal (2005) propose a Theory of Normative Behavior in which the relationship between descriptive norms and behavior is modified by injunctive norms, outcome expectations (which appear to be equivalent to perceived efficacy in the Theory of Planned Behavior), the relevance of the referent group to one's identity, and ego involvement, i.e. the degree to which the behavior in question is relevant to one's identity. They also suggest that the degree to which norms have influenced behavior in previous studies may be due in part to the characteristics of the behaviors that were studied, and therefore suggest accounting for behavioral attributes such as degree of ambiguity and anonymity in theories of conformity.

4.2. Economics

As insights from psychology have made their way into the field of economics, many economists have turned their attention to social norms as a determinant of behavior, which has led to the introduction of social norms into the paradigm of utility maximization. Elster (1989) hypothesized that behaviors that occur in the social sphere influence self-image due to the fact that an individuals' perception of their social image can inform their own self-image. In this framework, choices are determined through a consideration of the emotional consequences associated with anticipated changes to this self-image.

Akerlof and Kranton (2000) propose a model of behavior based on social difference, in which behavior is motivated by identity-based payoffs that depend on an individual's own behavior, the behavior of others, and his identity or self-image. Identity, in turn, is determined by an individual's actions, the actions of others, his assigned social category, personal characteristics, and role prescriptions, or the ideal characteristics assigned to someone of his own social category. When an individual's identity is associated with multiple social categories, the authors note the importance of the decision context in determining which identities are most salient. In this framework, a disunified identity produces anxiety, implying that the ultimate motivation for pursuing consistency in one's identity is to avoid negative emotions. Injunctive social norms, as they are understood within the literature on pro-environmental behavior, appear in this model by changing the prospective payoffs of individual action that are determined by third parties.

Sugden (2000) presents a Theory of Normative Expectations that rests on the hypothesis that individuals are motivated to comply with social norms in order to avoid feeling resentment from others. In this framework, individuals seek to maximize their own payoffs while meeting the expectations of others by reducing the negative impacts of their behavior on others' payoffs. Behavior is thus determined by anticipated individual payoffs, as well as the anticipated impact of one's own behavior on the payoffs of others. The inclusion of others' payoffs in this model is not interpreted as a preference or desire for compliance, but rather as a strategic concern, motivated by the indirect impact to one's own payoffs that could occur from being resented by others.

Bénabou and Tirole (2006) propose a model of prosocial behavior in which an individual's utility is given by a stock of assets that can be either material or immaterial in nature (e.g relational capital). According to this

model, individuals possess different levels of intrinsic altruism and make decisions based on the expected utility of the outcomes associated with different behaviors. Intrinsic altruism in this context is understood to stem from two sources: a pure altruism by which one cares about the total level of public good provided, and an impure altruism, by which one cares about the psychological joy-of-giving benefits they experience when behaving altruistically. The expected utility of engaging in prosocial behavior relies on the return to these assets, which is a function of both the material cost and the affective cost or benefit (as determined by a person's degree of altruism, which is comprised of both pure and impure motivations). A notable feature of this model is that people do not necessarily know their own level of altruism, and must therefore rely on their past behavior as a signal of their true degree of altruism. The authors note that "people who, deep down, are insecure about 'who they are' are the most prone to costly identity-affirming behaviors." As in Akerlof and Kranton (2000) social norms manifest in this model by influencing the material and affective payoffs associated with conformity. In a model that deals more explicitly with social norms, Bénabou and Tirole (2012) conceive of behavior as a function of three main factors: anticipated reputational effects, intrinsic motivation,[3] and extrinsic motivation. Here again, social norms influence choice via changes to anticipated material costs and reputational effects, which can be motivated by either social- or self-image related concerns. Like in Cialdini et al. (1990), salience is noted as a key determinant of the impact of a norm, and depends on situational factors (Bénabou and Tirole, 2006, 2012).

Gintis (2009) conceives of norms as the correlating devices of correlated equilibrium games and considers them to be an emergent property of complex adaptive systems. Similar to other theorists, Gintis (2009) also assumes that people have varying degrees of normative predisposition, that is, they are other-regarding in that they are predisposed to conform to social norms even when it is costly to do so. In another game-theoretic setting, Nyborg et al. (2006) construct a model in which agents can buy either a green (environmentally-friendly) product or a brown (not environmentally-friendly) product. Consumption behavior in this model is motivated by self-image concerns, which are influenced by an individual's belief about the positive external effects of his purchase, as well as the extent to which he has a personal responsibility to behave prosocially. This perceived responsibility, in turn, relies on descriptive norms as a signal. In a stylized economy, they show that perceived descriptive norms influence the equilibrium of green and brown purchases in the population. Young (2015) uses the dynamics of evolutionary game theory to describe how social norms evolve and how shifts in norms take place, understanding norms as equilibria of repeated games that are propagated by a positive feedback loop between individual and social behavior. Young identifies several evolutionary properties of social norms, including persistence (the tendency for norms to be slow to change), tipping and punctuated equilibriums (the rapidity and frequency of equilibrium shifts), compression (coordination around certain outcomes), and local conformity vs. global diversity (the tendency for different norms to emerge within different insular groups). Similar to others, Young also characterizes norms as self-enforcing at the group level, arising without top-down direction, capable of generating multiple equilibria, and highly dependent on context, which, in this framework, influences the probability and salience of interactions between individuals.

Bicchieri and Muldoon (2014) review three broad categories of theories that incorporate social norms: the socialized actor theory, social identity theory, and rational choice models of conformity, and identify the ways in which each of these types of theories are ultimately unable to accommodate the diversity of norm-related behavior in the real world. In contrast to these theories, Bicchieri (2006) conceives of norms as a cluster of self-fulfilling expectations, the emergence and stability of which are most usefully explored using game theory. In this framework, preferences to follow social norms are conditional, and conformity occurs when an individual holds both empirical expectations (a perceived descriptive norm) and normative expectations (a perceived injunctive norm) sufficient to convince him, through anticipated payoffs, to opt for conformity over deviation. In this framework, normative expectations transform mixed-motive games into coordination games in which conformity represents a Nash equilibrium. Bicchieri (2006) notes that this account of conformity accords with both rational choice models in which norms rely on conscious cost/benefit calculations, as well as heuristic models in which behavior can arise from a more automated thought process akin to the fast process of System 1 *à la* Kahneman (2011). In this way, social norms are understood in the context of a bounded rationality model in that agents behave rationally, albeit under greater cognitive constraints than those assumed by standard utility theory.

Empirical evidence supports several of these theoretical mechanisms. Fehr and Camerer (2007) review evidence from social neuroeconomic studies showing that prosocial behavior and third party norm enforcement are associated with increased activity in reward circuits in the brain, which reinforces theoretical accounts that posit some type of preference for conformity. Ellingsen et al. (2012) attempt to determine the drivers of changes in behavior due to changes in framing, and show that changes in behavior are driven by the impact of different contexts on beliefs, which lends support to theories contending that contextual elements evoke social norms in the form of preferences for following certain rules under certain situations. Ostrom (1998) also emphasizes the importance of contextual factors such as group norms of reciprocity in determining cooperation in common pool resource dilemmas. Using data from lab-in-the-field experiments in Columbian villages, Cardenas and Ostrom (2004) find empirical support for the importance of these contextual factors. These studies suggest that empirical and normative expectations, as well as the contextual factors that affect salience, all contribute to conformity.

Indeed, while some authors consider social norms to operate through more or less conscious processes via strategic concerns, others consider them to operate through preconscious processes. Christensen et al. (2004) study the effect of deliberation on the norm-behavior relationship and find that social norms may indeed impact behavior through both "fast" and "slow" processes. In light of these perspectives, an interesting recent contribution comes from Crusius et al. (2012), who advocate for a social-cognitive, or process-focused approach to future research on economic behavior. Social cognition research maintains that human behavior depends on an individual's subjective representation of reality, which is generated by how he perceives, interprets, and construes his past experiences and current situation. To demonstrate that "process matters," the authors cite research showing that 1) the same observable behavioral phenomena can operate through a variety of psychological mechanisms, 2) the same psychological mechanisms can operate across different domains, and 3) subjective context determines both how accessible certain thoughts are (e.g. priming), and the routes through which those thoughts affect behavior (e.g. temporal construal). Guala and Hindriks (2015) propose a unified social ontology that gives an account of institutions (a term encompassing norms, conventions, customs, laws, organizations, groups, identities, and roles) as correlated equilibria of coordination games, and that can accommodate for any number of specific norm-enforcement mechanisms.

Table 4 identifies the key determinants of conformity as outlined by several of these theories. Despite some variations, there seems to be a general consensus in the economics and social psychology literature that social norms function primarily through their implications for anticipated material and psychological payoffs. What also emerges is the widespread recognition of the importance of context in determining the role of social norms in decision-making processes. The commonalities shared by these theories inform the policy suggestions we present in Section 5.

[3] Here they consider intrinsic motivation to be 'liking and motivation for the task' in an organizational context, and an agent's 'degree of altruism or prosocial orientation' in the context of a public good, both of which are considered to be distinct from reputational concerns.

5. Lessons and Implications for Policymaking

Given the overall effectiveness of social norms in encouraging pro-environmental behaviors, as evidenced by the studies included in this review, a first lesson that emerges is that social norm interventions can indeed be an effective tool for behavior change by taking advantage of latent 'behavioral capital' (see Beretti et al., 2013). In this section, we derive practical implications from our review of the empirical and theoretical literature and augment these insights by synthesizing other policy recommendations that have been raised in the literature.

Kinzig et al. (2013) provide a broad overview on the state of the art of research on the norm-behavior-policy nexus, noting that "the general insights [from the literature] are that cooperative behaviors are more likely to emerge with repeated interactions in smaller, more homogeneous communities (or in networks that can recreate these conditions) that use punishment and communication to enforce norms and where there are few mistakes in propagating strategies or judging the need for sanctions." In addition, they note that, although government interventions are to some degree constrained by prevailing social norms, these interventions also have the capacity to precipitate lasting changes in social norms themselves. They identify four different types of policy strategies that can induce changes in social norms: active norm management, choice architecture, financial interventions, and regulatory measures. While active norm management attempts to change norms directly, the other three interventions attempt to shift social norms by encouraging people to first alter their behaviors, which can eventually lead beliefs to become aligned with these behaviors ('behavior-induced norm activation'). Practically speaking, these strategies could involve, for example, increasing the visibility or salience of a norm (when a favorable social norm exists) or increasing the convenience of compliance.

Although the specific type of social norm interventions that we study here have been shown to reduce energy consumption by an average of 2% in large scale randomized natural field experiments (Allcott, 2011; Costa and Kahn, 2013), it should be noted that social influence can be exerted in a variety of ways. Abrahamse and Steg (2013) provide a meta-analysis of different types of peer influence interventions, including the block leader approach, public commitment and modeling, group feedback, socially comparative feedback (providing information about one's behavior relative to the behavior of others), and the use of social norms in information provision (informing people about common behavior/attitudes) and feedback provision (informing people of their past behavior without any reference to the behavior of others). They find that these interventions vary in the degree to which they affect behavior, and that social norm interventions of the type that we study in this paper are effective, but somewhat less so than the block leader approach, public commitment, and modeling. They hypothesize that the strength of these three types of interventions could be due to the fact that these approaches tend to be implemented through face-to-face methods. Since face-to-face interaction arguably intensifies the power of social influence, they posit that the method used to implement these interventions may explain why they were found to be more effective than those that did not involve face-to-face implementation. They also note that social feedback provision often occurs in a fairly anonymous context, which could reduce its effectiveness relative to identity-revealing situations, and that average effects may mask the variable effectiveness that social norm messages might generate depending on moderating factors such as the degree to which an individual identifies with the reference group and the level of in-group communication and cohesion. Costa and Kahn (2013) indeed find that the impact of the normative intervention they study varies according to individuals' ideology (conservative vs. liberal), environmental preferences, and community characteristics. Given this, policymakers could do well to leverage existing synergies between social norms and personal norms, potentially by targeting populations that are known to have pro-environmental preferences.

Consequently, we highlight another lesson that emerges from this review: that implementing social norm interventions is not as straightforward as it may seem and that these interventions should be used with care (Corner, 2011). In energy studies, for example, the use of descriptive norms has been shown to have a boomerang effect for some individuals who learn that they outperform the norm (Allcott and Rogers, 2014; Schultz et al., 2007), a result that is not reflected in the main effects reported in Table 2. Messages communicating proscriptive injunctive norms should also be carefully considered, as the way in which they are received on an individual level may lead to undesirable psychological or behavioral consequences (Bryan et al., 2013). For this reason, a decision tree may be a useful guide for policy-makers who are considering using social norm interventions to induce behavior change. Based on the empirical studies available, we propose a decision tree such as the one described in Fig. 1. The considerations therein are derived from empirical findings showing that it can be counterproductive to emphasize the prevalence of undesirable behavior, and that a proscriptive norm appears to attract more cognitive attention than a prescriptive norm. This suggests, for example, that providing a proscriptive injunctive norm may be an effective strategy for encouraging beneficial behavior when only a minority of people currently engage in this behavior (Cialdini et al., 2006).

Miller and Prentice (2016) refer to social norm interventions that disseminate descriptive norms as social norm marketing, and characterize this blanket strategy as "scatter-shot," in that it casts a wide net, but does not necessarily hit the mark in every case. They contrast this strategy with the application of personalized feedback, or information about one's performance relative to others, coupled with positive and negative injunctive feedback according to this performance. Both of these strategies are reflected in Fig. 1. They suggest that, for those who underperform (assuming their preference is to underperform, since normative correctness doesn't appear to be important to them), it may be useful to leverage their concern for social status by using a descriptive norm. For over-performers, it may be useful to leverage their concern for normative correctness (assuming that this is important to them) in order to ensure that their behavior is framed positively (i.e. performing well), rather than negatively (i.e. being a sucker). Miller and Prentice (2016) also recognize that the desire not to be a sucker can be a powerful deterrent from behaving prosocially, and suggest that more research should be done regarding whether it may be possible to reduce the propensity to feel this sentiment through strategic framing.

While the behavioral impacts of interventions have been the subject of study for some time, the broader welfare impacts of these interventions are at present poorly understood. Although a social norm intervention may be effective in changing behaviors so as to improve environmental outcomes, most evaluative metrics do not measure the effects of compliance or deviation on subjective well-being. Thus, even if a social norm intervention is effective in shifting behavior in a desirable direction, this could conceivably come at a psychological cost that mitigates other improvements in welfare. Allcott and Kessler (2015) demonstrate that failing to fully incorporate the costs associated with behavioral interventions leads to an overestimation of their benefits. Morris et al. (2015) review research that examines the subjective effects of compliance to social norms and show that these effects can differ across cultures. Miller and Prentice (2016) also recognize this possibility when they observe that compliance with social norms may make people feel more comfortable. Given that many of the theoretical accounts of conformity involve not only material payoffs, but psychological payoffs as well, we contend that there is much left to understand with respect to the subjective impacts of conforming to or deviating from social norms, and that there is a distinct need for more comprehensive welfare analyses of social norm interventions and behavioral interventions more generally.

Finally, in reviewing the theories that incorporate social norms, we observe that there is no unified theoretical framework regarding how norms operate in the decision-making process. The plausibility of each

Table 2
Empirical results: Social norms and pro-environmental behavior.

Study	Context location, date[a] behavior or intention sample characteristics	Methods data collection analysis	Treatments[b]	Results[c]
Energy use				
Allcott (2011)	• USA, 2009–2010 • Household electricity use • 588,446 households	• Field experiment • Regression	1. Control 2. DN + IN	DN + IN: 2% average reduction in monthly energy use
Costa and Kahn (2013)	• USA, 2007–2009 • Energy use • 81,722 households	• Field Experiment • Regression	1. Control 2. DN + IN	DN + IN: 2% average reduction in daily energy use
Carrico and Riemer (2011)	• USA, prior to 2011 • Electricity use in the workplace • 595 university employees	• Observed electricity use, survey • Regression	1. Control 2. PDN (elicited) 3. PIN (elicited)	PDN: Not significant PIN: Not significant
Nolan et al. (2008) Study 1	• USA, 2003–2004 • Intention to conserve energy • 810 California residents	• Phone interviews • Regression	PDN (elicited)	PDN: Significant
Handgraaf et al. (2013)	• Netherlands • Electricity conservation in the workplace • 83 environmental consulting employees	• Field Experiment • Univariate tests	IN (approval or disapproval of past behavior)	IN: Significant
Oceja and Berenguer (2009) Study 1	• Spain • Turning lights off in a public restroom • 125 university students	• Field experiment • Univariate tests	1. Positive DN (lights off) 2. Negative DN (lights on)	DN: Significant impact of positive DN
Oceja and Berenguer (2009) Study 2	• Spain • Turning lights off in a public restroom • 200 university students	• Field Experiment • Univariate tests	1. DN 2. DN + IN	DN: Significant IN: Not significant
Nolan et al. (2008) Study 2	• USA • Household energy use • 371 California residents	• Personal interviews, field experiment • Univariate tests	1. Control 2. DN	DN: Significant
Schultz et al. (2007)	• USA • Household energy use • 287 households, San Marcos, CA	• Field Experiment • Univariate tests	1. DN 2. DN + IN	DN: Significant DN + IN: Significant (towards IN)
Smith et al. (2012) Study 1	• UK • Intention to conserve energy • 162 university students	• Survey • Univariate tests	1. DN 2. IN	DN: Not significant IN: Not significant
Smith et al. (2012) Study 2	• UK, China • Intention to conserve energy • 152 university students (80 in China, 72 in UK)	• Survey • Univariate tests	1. DN 2. IN	DN: Significant IN: Not significant
Recycling				
Andersson and von Borgstede (2010)	• Sweden, 2007 • Self-reported recycling behavior • 418 residents	• Survey • Regression	PIN + PDN (elicited)	PIN + PDN: Significant
Bratt (1999)	• Norway, before 1999 • Self-reported recycling behavior • 1282 Norwegian residents	• Survey • Structural equation modeling, regression	PIN (elicited)	PIN: No direct impact
Fornara et al. (2011)	• Italy, 2005 • Intentions to recycle • 452 residents	• Survey • Structural equation modeling	PIN and PDN (elicited)	PDN: Significant PIN: Not directly significant
Nigbur et al. (2010) Study 1	• Guilford, UK • Recycling behavior • 527 households	• Survey and observations • Regression	PIN and PDN (elicited)	PDN: Significant PIN: Not directly significant
Nigbur et al. (2010) Study 2	• Guilford, UK • Self-reported recycling behavior • 264 households	• Survey • Regression	PIN and PDN (elicited)	PDN: Significant PIN: Not directly significant
Ohtomo and Hirose (2007)			PDN and PIN (elicited)	PDN: Not directly significant

(continued on next page)

Table 2 (*continued*)

Study	Context location, date[a] behavior or intention sample characteristics	Methods data collection analysis	Treatments[b]	Results[c]
	• Japan • Intention to recycle • 206 students	• Survey • Structural equation modeling		PIN: Not directly significant
Schultz (1999)	• USA • Recycling behavior • 605 households	• Field experiment • Univariate tests	1. Control 2. DN	DN: Significant
Videras et al. (2012)	• USA, 2007 & 2009 • Self-reported recycling behavior • 902 residents	• Survey • Regression	PDN (elicited)	PDN: Significant
Viscusi et al. (2014)	• USA, 2009 • Household recycling • 1047 US residents	• Survey + observations • Regression	PDN and PIN (elicited)	PDN: Significant PIN: Significant
White et al. (2009) Study 1	• Australia • Intention to recycle • 164 Brisbane residents	• Survey • Regression	PIN and PDN (elicited)	PDN: Significant PIN: Not significant
White et al. (2009) Study 2	• Australia • Intention to recycle • 175 Brisbane residents	• Survey • Regression	PIN and PDN (elicited)	PDN: Significant PIN: Not significant
Other (green consumption, littering, water conservation, towel reuse, pesticide use)				
Ando et al. (2007) Study 1	• USA • Several self-reported conservation behaviors • 160 University students	• Survey • Regression	PDN and PIN (elicited)	PDN: Significant PIN: Not significant
Ando et al. (2007) Study 2	• Japan • Several self-reported conservation behaviors • 114 university students	• Survey • Regression	PDN and PIN (elicited)	PDN: Significant PIN: Not significant
Bator et al. (2011)	• USA, 2008 • Actual littering behavior • 102 people who disposed of something in a public place	• Observational study and intercept survey • Univariate tests, regression	DN (measured on a scale of how littered the environment)	DN: Not significant
Bohner and Schlueter (2014)	• Germany • Towel re-use • 928 hotel guests over two studies	• Field experiment • Regression	1. Control 2. DN	DN: Not significant
Carrico et al. (2013)	• USA, 2008 • Self-reported fertilizer use in the past year (binary) • 194 suburban households	• Interviews • Bivariate correlations, regression	1. PDN 2. PIN	PDN: Significant PIN: Significant
Ferraro et al. (2011)	• USA, 2007 • Household water use • 106,872 households	• Field experiment • Regression	1. Control 2. DN	DN: Significant
Garcia-Valinas et al. (2012)	• Europe, 1981–2001 (EVS and WVS) • Self-reported volunteer activity in environmental organizations	• Survey • Regression	PDN (elicited)	PDN: Significant
de Groot et al. (2013)	• UK • Actual plastic bag use • 200 supermarket customers	• Field experiment • Univariate tests	1. Control 2. IN	IN: Significant
Kim et al. (2012)	• USA, 2011 • Intention to purchase eco-friendly clothing • 332 online shoppers	• Survey • Regression	PIN and PDN (elicited)	PDN: Significant PIN: Significant
Maria Knight Lapinski et al. (2007)	• USA • Intention to conserve water • 72 students	• Survey • Regression	PIN and PDN (elicited)	PDN: Significant PIN: Significant
Goldstein et al. (2008) Study 1	• USA • Several self-reported conservation behaviors • 1604 California residents	• Interviews • Regression	PDN and PIN (elicited)	PDN: Significant PIN: Not directly significant
Goldstein et al. (2008) Study 2		• Field Experiment • Univariate tests	1. Control 2. DN	DN: Significant

	• USA • Towel reuse • 433 hotel guests in Southwest			
Reese et al. (2014)	• Switzerland and Austria • Towel reuse • 132 hotel guests	• Field Experiment • Univariate tests	1. Control 2. DN	DN: Significant
Schultz et al. (2008) Study 1	• USA • Towel reuse • 2359 hotel stays	• Field Experiment • Univariate tests	1. Control 2. DN 3. IN	IN: Not significant DN: Not significant
Schultz et al. (2008) Study 3	• USA • Towel reuse • 865 hotel stays	• Field Experiment • Univariate tests	1. Control 2. DN	DN: Significant
Schultz et al. (2008) Study 2	• USA • Towel reuse • 794 hotel stays	• Field experiment • Univariate tests	1. Control 2. IN + DN	IN + DN: Significant
Reese et al. (2014)	• Switzerland and Austria • Towel reuse • 132 hotel guests	• Field Experiment • Univariate tests	1. Control 2. DN	DN: Significant
Schultz et al. (2008) Study 1	• USA • Towel reuse • 2359 hotel stays	• Field Experiment • Univariate tests	1. Control 2. DN 3. IN	IN: Not significant DN: Not significant
Schultz et al. (2008) Study 2	• USA • Towel reuse • 794 hotel stays	• Field experiment • Univariate tests	1. Control 2. IN + DN	IN + DN: Significant
Schultz et al. (2008) Study 3	• USA • Towel reuse • 865 hotel stays	• Field Experiment • Univariate tests	1. Control 2. DN	DN: Significant
Staats et al. (2011)	• Netherlands, 2004 • Intention to use pesticides in commercial greenhouse • 743 greenhouse growers	• Survey + observations • Structural equation modeling	PDN and PIN (elicited)	PDN: Significant PIN: Not significant
Torgler et al. (2009)	• 30 European countries, 1981–2001 (EVS) • Self-reported justifiability of littering • ~30,000 EU residents	• Survey • Regression	PDN (elicited)	PDN: Negative
van Dijk et al. (2009) Study 1	• The Netherlands • Harvest decision in a CPR game • 64 university students	• Common pool resource lab experiment • Univariate tests	1. Control 2. DN	DN: Significant
Willy and Holm-Muller (2013)	• Kenya, 2011 • Soil conservation practices • 307 households	• Survey + interviews • Regression	PIN (elicited) DN (difference between own and group behavior)	PIN: Significant DN: Significant
Yeomans and Herberich (2014)	• USA, 2010 • Decision to inflate tires to improve fuel efficiency • 700 gas station customers	• Field experiment • Univariate tests	1. Control 2. DN	DN: Not significant

[a] When provided.

[b] DN and IN refer to descriptive and injunctive norms, and PDN and PIN refer to perceived descriptive and perceived injunctive norms. Following the purpose of this review, in some instances we provide a simplified representation of study designs, highlighting only those treatments relevant to the findings we report (see next footnote).

[c] We report only the main, direct effects of social norms found in each study. A significant impact indicates that the norm treatment resulted in behavior or intentions more closely matching the norm than in the control treatment. In the case of regression analysis, a significant impact indicates that the social norm parameter increases the degree of engagement in or propensity to engage in pro-environmental behaviors. Reported results are significant at the 10% level.

Table 3
Meta-results: The impact of social norm treatments on pro-environmental behaviors.

	Total number of studies	Proportion significant (number of studies with significant results/total number of studies)
Recycling		
Total	11	PDN: 8/9 PIN: 2/9
Behavior	7	DN: 1/1 PDN: 5/5 PIN: 2/5
Intention	4	PDN: 3/4 PIN: 0/4
Energy use		
Total	11	DN: 6/8 PDN: 1/2 IN: 4/7 PIN: 0/1
Behavior	8	DN: 5/5 PDN: 1/2 IN: 4/5 PIN: 0/1
Intention	3	DN: 1/1 PDN: 1/2 IN: 0/2
Other green behaviors		
Total	20	DN: 7/11 PDN: 9/9 IN: 2/3 PIN: 4/8
Behavior	16	DN: 7/11 PDN: 5/5 IN: 2/3 PIN: 2/5
Intention	4	PDN: 4/4 PIN: 2/3

of the mechanisms provided, coupled with an almost universal emphasis on the importance of context, leads us to suppose that developing a single theory regarding the effect of social norms on choice may indeed be unrealistic.[4] This highlights the fact that policymakers would do well to employ pilot studies to test the use of social norm interventions in the relevant context before implementing them on a large scale. Implementing pilot studies would help to minimize any unanticipated effects of social norm interventions that could result from unforeseen motivational factors in different contexts.

6. Conclusions and Future Research

From our review of the impacts of various types of social norm interventions on pro-environmental behaviors, we find that these interventions are effective at inducing significant changes in behavior, and that descriptive norms seem to demonstrate particularly consistent effects in this regard. Given the degree of heterogeneity in treatments used, moderating variables, and behaviors considered, we have chosen to report only the presence or absence of main effects for two reasons. First, such a review has not yet been carried out and therefore offers a useful perspective on the overall effectiveness of social norms interventions regarding pro-environmental behaviors. Second, this simple metric is easily aggregated and facilitates a clear and straightforward analysis. A more comprehensive meta-analysis that incorporates findings on moderating variables would be a more informative future endeavor, and we consider this work a first step in that direction. Through this review we also find that, although social norm interventions have been established as an effective means to induce behavior change, there remain important gaps in our knowledge regarding these changes.

[4] We address some implications of this observation in Section 6.

Insofar as we report only the presence or absence of main effects in the above studies, we are unable to make any statements about the overall magnitude of the behavioral changes generated by social norm interventions. Thus, while it is clear that social norms are a reliable determinant of pro-environmental behavior, we echo the call from other authors that more study should be done on how norms should best be leveraged. In a meta-analysis of energy conservation strategies, Delmas et al. (2013) find that comparative feedback is not a significant driver of behavior change and attribute this finding to a lack of large-scale studies examining the impact of this type of feedback. We add that a variety of factors concerning the way in which comparative feedback is implemented could be better understood.

Kinzig et al. (2013) note that our current scientific understanding of how policies impact social norms and how preexisting social norms impact policy outcomes is inadequate and highlight several directions for future research on social norms. They observe that academic research should be more closely linked to real-world scenarios by, for example, incorporating more realistic policy interventions and network structures into research questions and experimental designs. Future research should also explore in greater depth the role of deception and judgment errors in social norm enforcement and conformity, absolute vs. relative payoffs, and viscosity vs. fluidity (i.e. stability vs. adaptability) in norms and behaviors. We add that the interaction of social norm interventions with other types of pecuniary and non-pecuniary interventions would also seem a pertinent area for future research. In the context of motivational crowding-out theory developed by Frey and Jegen (2001), for example, monetary incentives may well crowd out social incentives and adherence to social norms, which could yield useful insights regarding the effective combination of policy instruments.

Other directions for future research could include the effect of social norms on group-level decision-making processes, and the most effective way to communicate social norms through the combination of prescriptive vs. proscriptive and descriptive vs. injunctive norms. With respect to group decision-making, for example, are social norm interventions also effective when decisions are made at the group level (e.g. households, community organizations, municipal districts, firms, etc.)? In these scenarios, it may be that choices are determined by an interaction between established within-group social norms and broader societal norms. Policymakers could conceivably leverage this knowledge by making certain reference groups more or less salient in designing social norm interventions. With respect to optimal interventions, would policymakers do better to encourage good behavior or discourage bad behavior? What 'units' are the most effective at inducing desirable behavior change? Communicating the message that 10,000 people have adopted a certain desirable behavior, for example, may emphasize the popularity of the behavior, and thus bear on people's normative predispositions to conform, while communicating the same message in relative terms, for example that 5% of the population has adopted this desirable behavior, may emphasize the relatively low cooperation rate and therefore induce little in the way of additional cooperation. For some, on the other hand, low cooperation rates may increase the adoption of desirable behavior through motivations to seek distinction (Bénabou and Tirole, 2006).

Another interesting avenue for future research concerns how descriptive and injunctive norms evolve, the interactions between the two in this process, and the relative roles that each of these play in the evolution of actual behaviors. Thøgersen's (2006) work raises the issue of how social norms become introjected norms, which presents an interesting connection to the literature on economics and identity. This psychological process has been investigated by others in the psychological literature (see Morris et al., 2015), but has not yet been examined in the context of formalized models. Another area to be explored concerns the possibility that belonging to various social groups (e.g. family, firm, neighborhood, etc.) can generate a variety of social norms that can converge or diverge in their prescriptions, and would investigate the dynamics between them.

Table 4
Theories of about the Social Norm-Behavior Relationship.

Authors	Theory name	Determinants of conformity
Social psychology		
Ajzen (1991)	Theory of Planned Behavior	• Attitudes • Injunctive Norms • Perceived Self Efficacy
Cialdini et al. (1990)	Focus Theory of Normative Conduct	• Norm salience • Motivations for accuracy, affiliation, and positive self-image • Injunctive norms
Lapinski and Rimal (2005)	Theory of Normative Behavior	• Outcome expectations • Relevance of referent group to one's identity • Level of ego-involvement in the behavior
Economics		
Akerlof and Kranton (2000)	Identity economics	• Descriptive norm • Personal identity (a function of the difference between one's own behavior and the behavior of others, one's assigned social category, personal characteristics, and the injunctive norms assigned to someone of his social category)
Bénabou and Tirole (2012)		• Anticipated reputational effects • Intrinsic motivation • Extrinsic motivation
Bicchieri (2006)		• Normative and empirical expectations • Personal threshold for action based on expectations • Material payoffs • Sensitivity to the salient social norm • Decision context (situational cues)
Gintis (2009)	Epistemic Game Theory of Social Norms	• Normative predisposition (preference) to conform, which varies by individual • Material payoff (consisting of public and private components) • Norm activation and expectations of norm activation • Normative and empirical expectations
Nyborg et al. (2006)		• Self-image concerns (a function of an individual's belief about the positive external effects of his behavior) • Perceived personal responsibility to behave prosocially (a function of descriptive norms) • Normative and empirical expectations
Sugden (2000)	Theory of Normative Expectations	• This theory rests on three assumptions: 1) people approve and disapprove of others for obeying or disobeying norms, 2) feelings of approval/disapproval are costless, automatic, and unintended, and 3) people desire the approval of others.

To address the diversity of approaches to social norms found in the theoretical literature, future work could also concentrate on comparing the suitability of different theories in explaining empirical results, as well as the impact of social norms on behavior as they operate through both conscious and preconscious cognition (see Crusius et al., 2012). Given that a single decision-making theory is unlikely to explain behavior well in every context, there is a special need to identify those contexts that produce robust behavioral regularities and the elements of these contexts that matter most in determining the predictive capabilities of theoretical models. Finally, we note that a consideration of the ethicality of social norm interventions should obviously precede considerations surrounding the design and implementation of these interventions (see

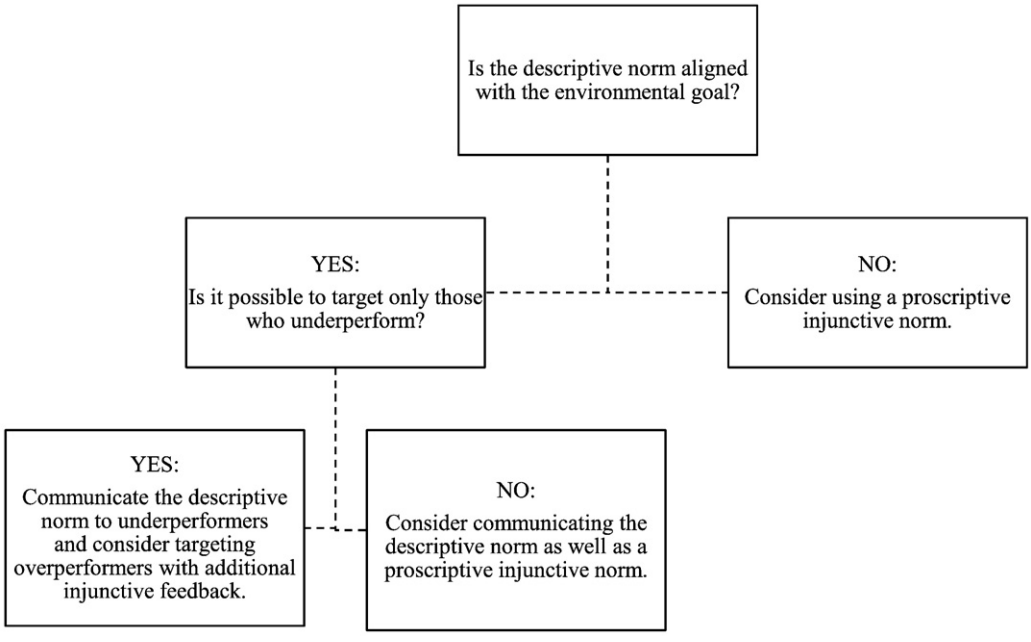

Fig. 1. Social norm intervention decision tree.

Schubert, 2017 for an approach to determining the ethical quality of green nudges). In sum, the evidence presented here demonstrates that beliefs about the behavior and attitudes of others are a reliable determinant of individual behavior with respect to the environment, and that efforts to better understand this phenomenon should be an important element in the continued pursuit of effective environmental policy measures.

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