Article

Trending Norms: A Lever for Encouraging Behaviors Performed by the Minority

Chad R. Mortensen[1], Rebecca Neel[2], Robert B. Cialdini[3],
Christine M. Jaeger[4], Ryan P. Jacobson[5], and Megan M. Ringel[6]

Abstract

If many people currently engage in a behavior, others are likely to follow suit. The current article extends research on these *descriptive norms* to examine the unique effect of *trending norms*: norms in which the number of people engaging in a behavior is increasing—and even if this is only among a minority of people: *trending minority norms*. The current research shows people conform more to these trending minority norms than a minority norm alone, or a no norm control condition—even though the norms addressed behaviors that differed from the target behavior. This demonstrates a distinct effect of trends and a strategy for leveraging normative information to increase conformity to behaviors not yet performed by a majority. Findings support that this increased conformity emerges because people predict the increase in prevalence will continue. An internal meta-analysis examining all data we collected on this topic supports these conclusions.

Keywords

norms, trends, conservation, social influence, conformity

Social norm interventions are widely recognized to powerfully influence behavior, with a long history of promoting prosocial behaviors. From reducing binge drinking (Neighbors, Larimer, & Lewis, 2004), to encouraging healthier eating (Robinson, Fleming, & Higgs, 2014), to promoting critical pro-environmental behaviors such as recycling (Schultz, 1999), energy conservation (Goldstein, Cialdini, & Griskevicius, 2008; Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007), water conservation (Goldstein, Cialdini, & Griskevicius, 2007; Goldstein et al., 2008), and avoiding littering (Cialdini, Kallgren, & Reno, 1991; Cialdini, Reno, & Kallgren, 1990; Kallgren, Reno, & Cialdini, 2000; Reno, Cialdini, & Kallgren, 1993), normative interventions have been leveraged across sectors and populations by academics and practitioners alike to promote desirable behavior that is commonly performed by others (see National Social Norms Center for review; http://socialnorms.org).

A primary reason people rely on descriptive norms is to make better decisions (Cialdini et al., 1990). Focusing on the current popularity of a behavior can provide an important insight into behaviors that may have been beneficial in the past or may be beneficial in the present. Indeed, communicating that a behavior is common spurs that same behavior in others (Cialdini & Goldstein, 2004) with little required cognitive effort (DeBono, Shmueli, & Muraven, 2011; Jacobson, Mortensen, & Cialdini, 2011; Jacobson, Mortensen, Jacobson, & Cialdini, 2015). The more salient and popular a behavior is, the more strongly the social norm influences behavior (Asch,

1955; Cialdini et al., 1990; Milgram, Bickman, & Berkowitz, 1969).

Descriptive norms have traditionally been conceptualized as the current prevalence of a behavior. However, this is not the only form of descriptive normative information that may be valuable to a person interested in making a "good decision." The environments in which humans are embedded are changing and dynamic, and what worked yesterday might not work tomorrow. One hallmark of our species is our adaptability to changing environments (e.g., Boyd, Richerson, & Henrich, 2011), and trends may alert us to new strategies that could prove highly beneficial.[1] Thus, a potentially important type of descriptive normative information, *trending norms*, has been neglected in prior research. Indeed, past work shows that people tend to assume change in one direction will continue in that direction (Hubbard, 2015; Markman & Guenther, 2007), and

[1] Metropolitan State University of Denver, Denver, CO, USA
[2] University of Iowa, Iowa City, IA, USA
[3] Arizona State University, Tempe, AZ, USA
[4] California State University, San Marcos, CA, USA
[5] University of New Mexico, Albuquerque, NM, USA
[6] University of California, Irvine, CA, USA

Corresponding Author:
Chad R. Mortensen, Department of Psychology, Metropolitan State University of Denver, Denver, CO 80217, USA.
Email: cmorten2@msudenver.edu

potential outcomes that are increasing in probability feel more imminent (Maglio & Polman, 2016). Thus, portraying a behavior as increasing in popularity may create a perception of greater future popularity.

The first focus of the current research is to examine the unique effect of communicating trends in norms without confounding trends and popularity as in past research. Although research shows trending norms to be successful, trending norms (e.g., "Most people would like abortion to be more accessible. Furthermore, this opinion is getting stronger") were compared only to no norm control conditions (e.g., Nadeau, Cloutier, & Guay, 1993). Thus, although trending norms were successful, this could be solely due to the norm (most people), not the trend component (getting stronger). The current research includes conditions that hold the current popularity constant while manipulating only the presence/absence of a trend to examine its unique effect.

The second focus, from an applied perspective, is to demonstrate that trends may be particularly useful when norms alone are ineffective or even counterproductive. Specifically, communicating that only a numerical minority of people performs a desirable behavior does not encourage conformity and can even backfire, as it can establish a norm of not engaging in the behavior (Cialdini et al., 2006). This is problematic if these norms are well known and poses a conundrum for those wishing to use norms to encourage behaviors that most people are not currently performing. Thus, for improved applicability, we identify and test whether these behaviors performed by the minority may nonetheless be successfully encouraged with *trending minority norms*: normative messages that emphasize a minority norm is increasing in popularity.

Furthermore, the current research uses normative messages that do not directly address the target behavior. This demonstrates the ability of trending norm effects to affect other related, desirable behaviors (Cialdini et al., 1990; Keizer, Lindenberg, & Steg, 2008). The research also targets real behavioral outcomes related to environmental responsibility—meeting calls for basic research in applied domains (e.g., Reich, 2008).

We report two experiments that represent the culminations of two related lines of research. For each line, we conducted several pilot studies to refine methods and provide initial tests of our hypotheses. Although we focus here on the two end studies, we also present an internal meta-analysis of all of the research we conducted on this topic (Braver, Thoemmes, & Rosenthal, 2014; Maner, 2014; Maxwell, Lau, & Howard, 2015; see Supplemental Online Material [SOM] for more detail). This meta-analysis suggests that the effects of Experiments 1 and 2 are robust.

Experiment 1

We predicted that communicating a trending minority norm—a behavior performed by a numerical minority but increasing in prevalence—would increase behavior over and above communicating a minority norm only. Furthermore, we sought to test whether trending norms avoid backfire effects that can occur with minority norms only. We tested these predictions in the domain of water conservation while brushing teeth. We also measured the *anticipated* popularity of water conservation in the future, which we predicted would mediate the effects.

Method

Participants

Based on the effect sizes of our pilot studies, we sought a minimum of approximately 90 participants (see SOM) recruited from introductory psychology classes at a medium-sized university. We ultimately collected data from 105 participants who completed the toothbrushing task and did not have their data excluded before analyses (see Results for exclusion criteria), out of 114 participants (72 female, 38 male, 4 unreported; $M_{age} = 22.41$, $SD_{age} = 5.60$) total. Because some participants did not complete all items, sample sizes for analyses vary.

Materials and Procedure

To reduce suspicion, participants were told there would be two separate studies, with the first study examining the relationship between personality and editing skills. Participants sat alone at computers to read statements regarding students' water conservation behaviors. In the *minority norm only* condition, participants read, "Research from (previous year) has found that 48% of (University name) students engage in one or more of the following water conservation behaviors." Behaviors included "turning off the water while soaping their hands during handwashing; using low-flow shower heads; watering lawns and plants in the early morning or evening." The trending minority norm condition added, "This has increased from 37% in (2 years previous)." To prevent demand characteristics resulting from participants linking this to the target behavior, and demonstrate the ability of norms to transfer to other behaviors, brushing teeth was not specifically mentioned. Participants in the *control* condition read about architectural trends with no specific numbers, as even irrelevant numbers can affect behavior (Ariely, Loewenstein, & Prelec, 2003). Next, participants evaluated the statement's clarity to reinforce the cover story. Participants then reported on 7-point Likert-type scales, and with exact percent estimates, how common they thought the formerly presented behaviors were among university peers now (a projected estimate, given that the manipulation referenced previous years), a year from now, and 6 years from now. Separate composites were created for the Likert-type items ($\alpha =$ .87) and for the percent estimates ($\alpha = .85$). Participants in the control condition were asked similar questions regarding architectural trends. Finally, participants were asked to rewrite the statement to ensure careful reading. After spending roughly 5–10 min completing several personality measures (see SOM), the researcher informed participants that they had completed the study and directed them to a separate lab room.
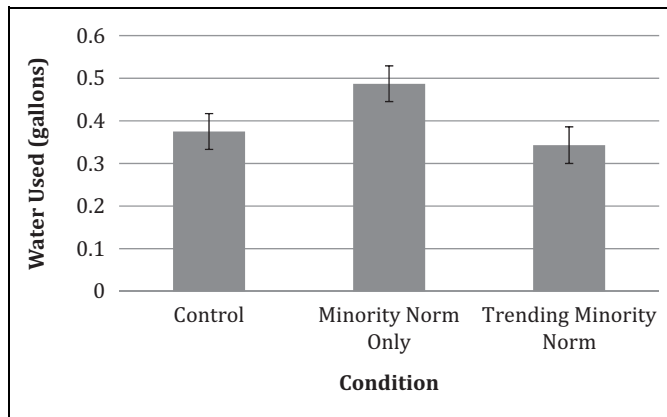
Figure 1. Mean water used (gallons) depending on the normative message received in Experiment 1. Error bars represent standard errors.

A second researcher informed participants that their study was examining the relationship between product preferences and personality types. Participants were asked to select one toothpaste and brush their teeth at a sink, surreptitiously equipped with a water meter (Model DLJSJ50; Daniel L. Jerman Company, Hackensack, NJ). The researcher left the room, stating they did not want to influence participants' decisions. Upon completion, the researcher reentered the room and asked participants to complete additional measures (see SOM), which took approximately 5–10 min. Finally, participants completed demographic information and a suspicion probe and were debriefed.

Results

Three participants were removed for not following directions when brushing teeth (e.g., sampling multiple toothpastes), and one for overhearing another participant's debriefing. A small number of remaining participants used far more water than was typical. Two outliers per condition were removed using a planned recommended standard of 2.5 SD within conditions adjusted for sample size (Van Selst & Jolicoeur, 1994; previously used in all pilot studies). This left 99 remaining participants.

Water Use

Two sinks differing in water flow were used, $F(1, 95) = 4.11$, $p = .046$, $\eta_p^2 = .04$, 95% confidence interval (CI) [−0.200, −0.002]; the sink used was therefore included as a covariate. An one-way analysis of covariance found a significant effect of the messages on water use, $F(2, 95) = 3.31$, $p = .041$, $\eta_p^2 = .07$ (see Figure 1).[2] Contrasts showed the trending minority norm caused significantly less water use ($M = 0.34$ gallons, $SD = 0.04$) than the minority norm only ($M = 0.49$ gallons, $SD = 0.04$), $F(1, 95) = 5.94$, $p = .02$, $\eta_p^2 = .06$, 95% CI [−0.261, −0.027].[3] While the trending minority norm and control conditions did not differ ($M = 0.38$ gallons, $SD = 0.04$), $F(1, 95) =$

0.29, $p = .59$, $\eta_p^2 = .003$, 95% CI[−0.150, 0.086], there was marginally less water use in the control condition compared to the minority norm only, indicating a marginal backfire effect, $F(1, 95) = 3.65$, $p = .06$, $\eta_p^2 = .04$, 95% CI [−0.004, 0.228].[4]

Projected Water Conservation

One-way analyses of variance (ANOVAs) conducted on each of the two composites showed the trending minority norm produced significantly higher estimates of the percentage of students engaging in conservation behaviors ($M = 59.01$, $SD = 15.88$) than the minority norm only ($M = 49.52$, $SD = 14.34$), $F(1, 59) = 6.02$, $p = .02$, $\eta_p^2 = .09$, 95% CI [−17.233, −1.749]. Although the pattern of data for the Likert-type scales corresponded, there was no significant difference between the trending minority norm ($M = 5.33$, $SD = 1.21$) and norm only ($M = 4.77$, $SD = 1.23$), $F(1, 62) = 2.15$, $p = .15$, $\eta_p^2 = .03$, 95% CI [−1.057, 0.162].

Effect of Projected Water Conservation on Water Use

To examine whether the perceived popularity of conservation behaviors affected water use, regression analyses were conducted using the popularity estimate composites as predictors of water use, with the sink used by participants included as a covariate. Participants' predictions of popularity using percentages significantly predicted water use, $B = −0.005$, $t(58) = −2.29$, $p = .03$, 95% CI [−0.009, −0.001]. This effect was marginally significant for the Likert-type scales, $B = −0.05$, $t(61) = −1.76$, $p = .08$, 95% CI [−0.101, 0.007].[5] However, this was no longer significant when controlling for the effect of the norm manipulation for the percentages, $B = −0.004$, $t(57) = −1.66$, $p = .10$, 95% CI [−0.009, .266] or Likert-type scales $B = −0.04$, $t(60) = −1.40$, $p = .17$, 95% CI [−0.090, 0.016]. Thus, although mediation effects were in the predicted direction, the effect of the mediator was not significant when controlling for the manipulation, and therefore further mediation analyses were not justified (Judd, Yzerbyt, & Muller, 2014; but see SOM for exploratory analyses).

Discussion

Using a behavioral task and subtle manipulation, normative messages encouraging water conservation were more effective when they included an increasing trend than when they did not. A marginal backfire effect was also found, such that those who saw a minority norm only used more water than those in a control condition. This demonstrates a unique effect of trends in normative influence, and a useful application when a minority norm is already commonly known, as it can negate backfire effects minority norms can cause. The reduction in water usage caused by a trending norm was not significant compared to receiving no norm information at all, however. Impressively, these effects occurred even though the messages did not

address the target behavior directly, but rather similar behaviors, which has a weaker effect (Cialdini et al., 1990, study 5).

The trending minority norm also caused greater estimates of water conservation popularity than the minority norm only. These estimates predicted water use, but popularity estimates did not significantly mediate the effect of normative messages on water use. While we found a clear effect of trend information, the effects were somewhat weaker than in the pilot studies we conducted and did not reduce water usage compared to a control condition. In Experiment 2, we sought to conceptually replicate this study using a different paradigm as well as a well-powered sample, which would improve our ability to test mediation by popularity estimates.

Experiment 2

This experiment examined the effects of trending minority norms in a different domain: donations to environmental causes. We asked participants to pilot test a message asking for financial donations to an environmental organization. This message contained the norm manipulation. We then asked participants to donate *time* by completing additional surveys for the environmental organization. We hypothesized that the trending minority norm would lead more people to donate than the minority norm only. Additionally, a larger sample allows us to more robustly test whether the trending minority norm increases conformity compared to the control, whether the minority norm only significantly backfires and creates less conformity than control, and whether perceptions of popularity mediate these effects.

Method

Participants

We conducted a series of power analyses guided by the effect size from a pilot study using this paradigm (see SOM). Based on our pilot study, we sought 80% power to detect an effect in the range of 8–10% difference between conditions. Taking cost into consideration, we settled on a target N of 1,150 (see SOM). Exclusions of repeat Internet protocol addresses reduced this to 1,053 adults (50.3% male, 79.6% White, M_{age} = 33.6, SD_{age} = 10.9) who participated via Amazon's Mechanical Turk (MTurk). Some participants did not complete all items, so sample sizes for analyses vary.

Materials and Procedure

Participants were recruited to "examine messages about organizations and donations." First, participants answered items measuring attitudes toward a variety of political issues, early adopter and conformity tendencies (see SOM), and demographic information. Next, participants were told, "our research team is working with the Student Earth Awareness Association (SEAA) to help improve the effectiveness of their outreach efforts. The SEAA organizes students at community colleges and universities to work to preserve natural

resources. We are piloting a new message on behalf of the SEAA and would like your feedback" (adapted from Neufeld et al., 2012). Participants were then presented with a message that requested financial donations, and told, "...we are NOT asking you to donate funds, but only to provide feedback on the message."

By random assignment, participants read one of three messages. All messages began, "The Student Earth Awareness Association (SEAA) is a nonprofit environmental advocacy group that works to preserve natural resources. The SEAA is collecting donations to fund our organization's environmental preservation efforts." The trending minority norm message then stated, "In July [previous year], 48% of the MTurk workers who took our surveys donated funds to the SEAA. This increased from 17% in July (2 years previous). Please help if you can." The minority norm only message excluded the statement about the increase. The *control* message excluded both norm statements. To maintain the cover story, participants were asked questions about the message (e.g., clarity and length). Participants were then asked to project the commonness of MTurk workers donating money "THIS year," "NEXT year," and "SIX years from now" on both a 7-point Likert-type scale (α = .92) and as an exact percentage (α = .94).

Next, participants were told that their work was complete but asked if they would complete up to 9 extra (1 min each) questionnaires to help the SEAA. Willingness to donate this time served as our primary dependent measure. Participants were assured they would receive payment regardless of their choice. Those who chose to complete extra questionnaires proceeded to nine questionnaires on separate pages, with an option to exit on each page. Participants then completed a suspicion probe, were debriefed, and were paid, with a surprise bonus for workers who donated extra time.

Results

For time donations, we examined both willingness to complete surveys (binary outcome) and how many surveys they completed (continuous outcome).

Willingness to Complete Surveys

Logistic regressions were conducted to determine whether a trending minority norm produced greater willingness to complete surveys (binary outcome) than a minority norm only or no norm control. We used Exploratory Software for Confidence Intervals (ESCI; Cumming, 2012) for confidence intervals. As predicted, the trending minority norm produced greater willingness to donate (47.2%) than the minority norm only (37.1%), B = 0.21, SE = .08, Wald = 7.36, p = .007, odds ratio = 1.23, 95% CI [2.8%, 17.2%], or control (39.1%), B = 0.17, SE = .08, Wald = 4.75, p = .029, odds ratio = 1.18, 95% CI [0.8%, 15.4%] (see Figure 2). The control and minority norm only conditions did not differ, B = −0.04, SE = .08, Wald = .27, p = .60, odds ratio = .96.
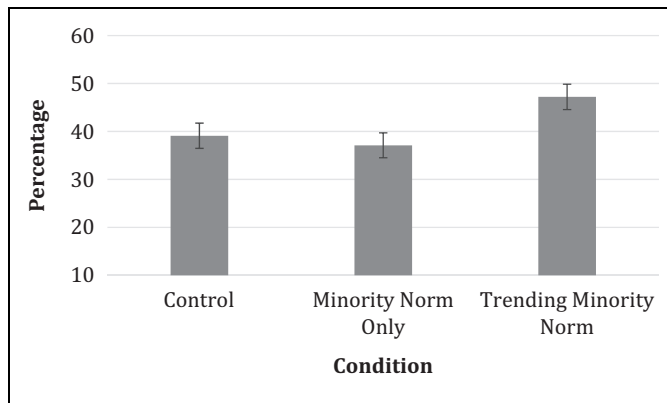
Figure 2. Percentage of participants willing to complete surveys depending on the normative message received in Experiment 2. Error bars represent standard errors.
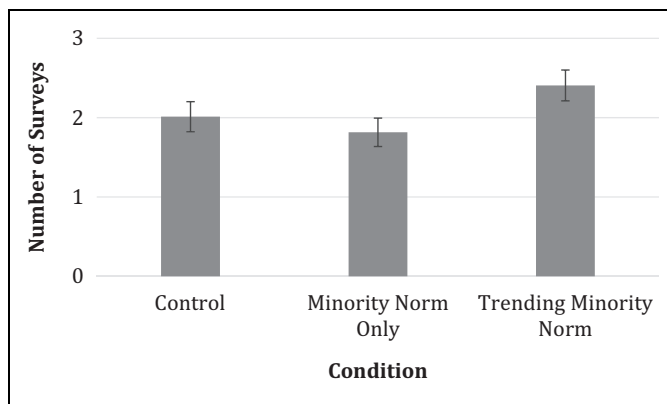

Figure 3. Mean number of surveys completed depending the normative message received in Experiment 2 (untransformed). Error bars represent standard errors.

Surveys Completed

We analyzed this continuous variable with an ANOVA. A logarithmic transformation was used to reduce skewness (from 1.57 to 1.04). We analyzed the transformed variable but report untransformed means. An ANOVA found that the conditions differed significantly, $F(2, 1,050) = 3.49$, $p = .03$, $\eta_p^2 = .01$ (see Figure 3). Participants completed significantly more surveys in the trending minority norm condition ($M = 2.41$, $SE = 3.69$) than the minority norm only condition ($M = 1.81$, $SE = 3.34$), $F(1, 1,050) = 6.43$, $p = .01$, $\eta_p^2 = .01$, 95% CI [−0.301, −0.038], and marginally more than the control condition ($M = 2.01$, $SE = 3.51$), $F(1, 1,050) = 3.56$, $p = .06$, $\eta_p^2 = .003$, 95% CI [−0.259, 0.005].

Projected Commonness of Financial Donation

We analyzed this continuous variable with an ANOVA. As predicted, there was a significant difference by condition in projected commonness of donating money, $F(2, 1,049) = 82.00$,

$p < .001$, $\eta_p^2 = .14$, with the trending minority norm producing greater projected commonness overall ($M = 4.69$, $SD = 1.24$) than the minority norm only ($M = 4.29$, $SD = 1.25$), $F(1, 1,049) = 17.57$, $p < .001$, $\eta_p^2 = .02$, 95% CI [−0.597, −0.216], or control ($M = 3.46$, $SD = 1.38$), $F(1, 1,049) = 158.82$, $p < .001$, $\eta_p^2 = .13$, 95% CI [−1.420, −1.038]. Parallel results were found for the projected percentages, $F(2, 1,049) = 183.64$, $p < .001$, $\eta_p^2 = .26$, with the trending minority norm producing a higher projected percentage overall ($M = 47.76$, $SD = 18.97$) than either the minority norm only ($M = 41.73$, $SD = 18.10$), $F(1, 1,049) = 18.91$, $p < .001$, $\eta_p^2 = .02$, 95% CI [−8.747, −3.307], or control ($M = 22.14$, $SD = 18.24$), $F(1, 1,049) = 338.60$, $p < .001$, $\eta_p^2 = .24$, 95% CI [−28.349, −22.886].

Mediation of Survey Completion by Projected Commonness of Financial Donation

To test whether projected commonness of financial donations mediated the effect of the messages on willingness to complete surveys, linear (for the effects of X on M) and logistic (for the effects of X and M on Y) regressions were used in conjunction with bootstrapping procedures. We focus here on the projected percentages (the pattern is the same for the Likert-type items). The analysis used PROCESS Model 4 in SPSS (Hayes, 2012) with 5,000 bootstrapped samples.

We conducted four mediation analyses (see Table 1), testing the effects of trending minority norm on willingness to complete surveys (Models 1 and 2) and on number of surveys completed (log-transformed; Models 3 and 4). We compared trending minority norms to the minority norm only (Models 1 and 3) and to the control conditions (Models 2 and 4). All mediation analyses were consistent with the hypothesis that the effect of trending minority norms on survey completion was mediated by a greater projected percentage of MTurk workers financially donating.

Discussion

The trending minority norm produced greater willingness to help an environmental organization than did either the minority norm only or no norm control. The trend led participants to project that financial donations would be more common in the future, and mediation analyses support that these projected future increases accounted for the impact of trending norms. Strikingly, a trending norm increased compliance compared to control, even though participants were told only a minority of people were engaging in the behavior.

Interestingly, a minority norm only increased the projected commonness of donating (42%) compared to a control (22%), perhaps because the norm of 48% was higher than people would otherwise assume. However, this did not increase the likelihood of compliance. Accompanying a minority norm with trend information appears to buffer against the potentially detrimental effects of a minority norm.

Table 1. Mediation Analyses for the Effect of the Trending Minority Norm, Compared to Minority Norm Only or Control Conditions, via Projected Percent of Mechanical Turks (MTurkers) Donating.

Model	X	Y	n	Effect	B	SE	t/z	p	95% CI of B
1.	Trending minority norm versus minority norm only	Willingness to complete surveys	709	X on M	3.01	.70	4.33[a]	<.001	[1.65, 4.38]
				M on Y, controlling for X	0.010	.004	2.37[b]	.02	[0.002, 0.018]
				Direct effect of X on Y, controlling for M	0.18	.08	2.28[b]	.02	[0.025, 0.329]
				Indirect effect of X on Y via M	0.03	.02			[0.006, 0.067]
				Total effect of X on Y	0.21	.08	2.68[b]	.007	[0.055, 0.355]
2.	Trending minority norm versus control	Willingness to complete surveys	703	X on M	12.81	.70	18.23[a]	<.001	[11.43, 14.19]
				M on Y, controlling for X	0.012	.004	2.93[b]	.003	[0.004, 0.020]
				Direct effect of X on Y, controlling for M	0.01	.09	0.13[b]	.90	[−0.171, 0.195]
				Indirect effect of X on Y via M	0.16	.06			[0.053, 0.278]
				Total effect of X on Y	0.17	.08	2.18[b]	.03	[0.017, 0.317]
3.	Trending minority norm versus minority norm only	Surveys completed (log)	709	X on M	3.01	.70	4.33[a]	<.001	[1.65, 4.38]
				M on Y, controlling for X	0.004	.002	2.17[a]	.03	[0.0004, 0.0075]
				Direct effect of X on Y, controlling for M	0.07	.03	2.14[a]	.03	[0.006, 0.139]
				Indirect effect of X on Y via M	0.01	.02			[0.002, 0.026]
				Total effect of X on Y	0.08	.03	2.51[a]	.01	[0.018, 0.150]
4.	Trending minority norm versus control	Surveys completed (log)	703	X on M	12.81	.70	18.23[a]	<.001	[11.43, 14.19]
				M on Y, controlling for X	0.006	.002	2.97[a]	.003	[0.002, 0.009]
				Direct effect of X on Y, controlling for M	−0.01	.04	−0.16[a]	.88	[−0.09, 0.08]
				Indirect effect of X on Y via M	0.07	.02			[0.027, 0.120]
				Total effect of X on Y	0.06	.03	1.85[a]	.06	[−0.003, 0.131]

Note. For all analyses, M = projected percentage of MTurk workers donating.
[a]Values are *t* values. [b]Values are *z* values for logistic regressions. CI = confidence interval.

Meta-Analysis

Experiments 1 and 2 stemmed from two series of studies (one testing water use, one testing online donations). Within each, there were variations in manipulations of the trending norm, measures of the dependent variable, and individual difference measures included (see SOM). Although these initial studies included small samples and design elements that were improved as the research progressed, we wanted to examine whether the totality of data gathered supported the conclusions of Experiments 1 and 2.

To do so, we conducted a series of internal meta-analyses (Borenstein, Hedges, Higgins, & Rothstein, 2009; Braver et al., 2014) that included our prior studies as well as Experiments 1 and 2. Because of the methodological heterogeneity across studies, we used random effects models. To be included, the study needed to have a trending norm condition along with a control and/or norm only condition. Despite potential problems with some studies, we conservatively retained all studies satisfying these criteria.

First, we meta-analyzed all studies with trending norm and norm only conditions ($k = 8$). This analysis revealed a small-to-medium effect, $g = 0.29$, $p = .001$ (see Figure 4), such that the trending norm led to greater compliance. These studies had small and nonsignificant heterogeneity, $Q = 7.57$, $p = .37$, $I^2 = 7.57$, indicating no meaningful variability in the magnitude or direction of the effect across studies. Next, we meta-analyzed all studies that included both trending norm and control conditions ($k = 8$). This analysis also revealed a significant effect, $g = 0.14$, $p = .012$ (see Figure 5), with no discernable heterogeneity, $Q = 4.37$, $p = .74$, $I^2 = 0.00$ (see SOM for additional meta-analyses).

Thus, data across our entire program of research show that a trending norm led to more conformity than a norm only or no norm control. Both effects were small, but this is likely a conservative estimate. Studies with weaker designs were included, and, by their nature, meta-analyses including all studies conducted to test a question are likely to produce smaller estimates of the effect than publishing only "successful" research
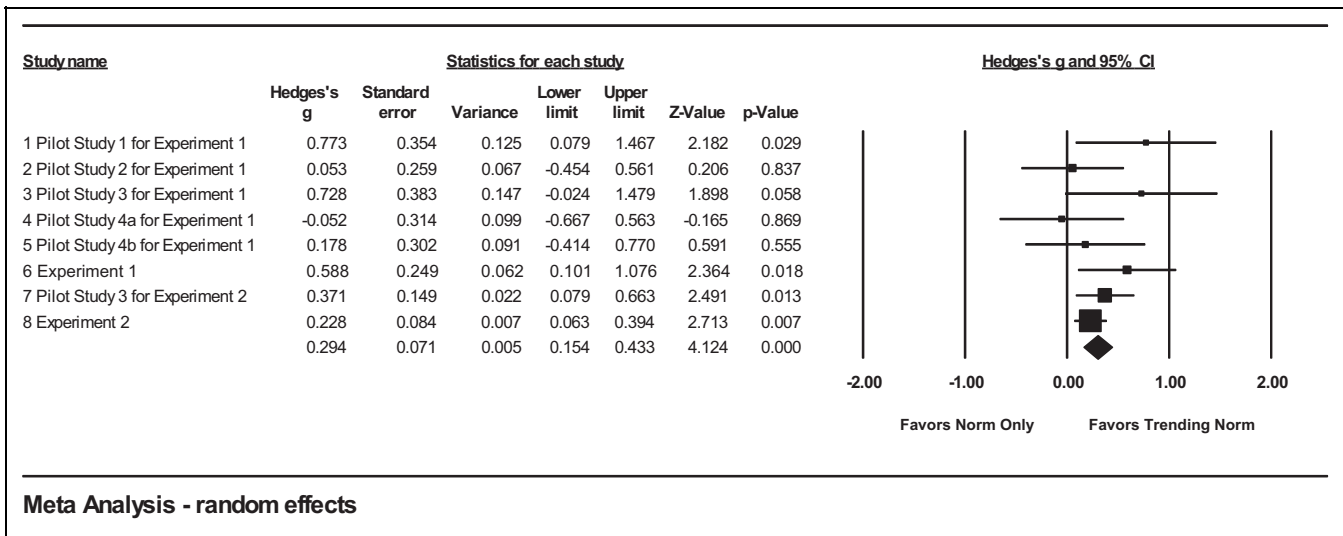
Figure 4. Meta-analysis of trending norm conditions compared to norm only conditions.
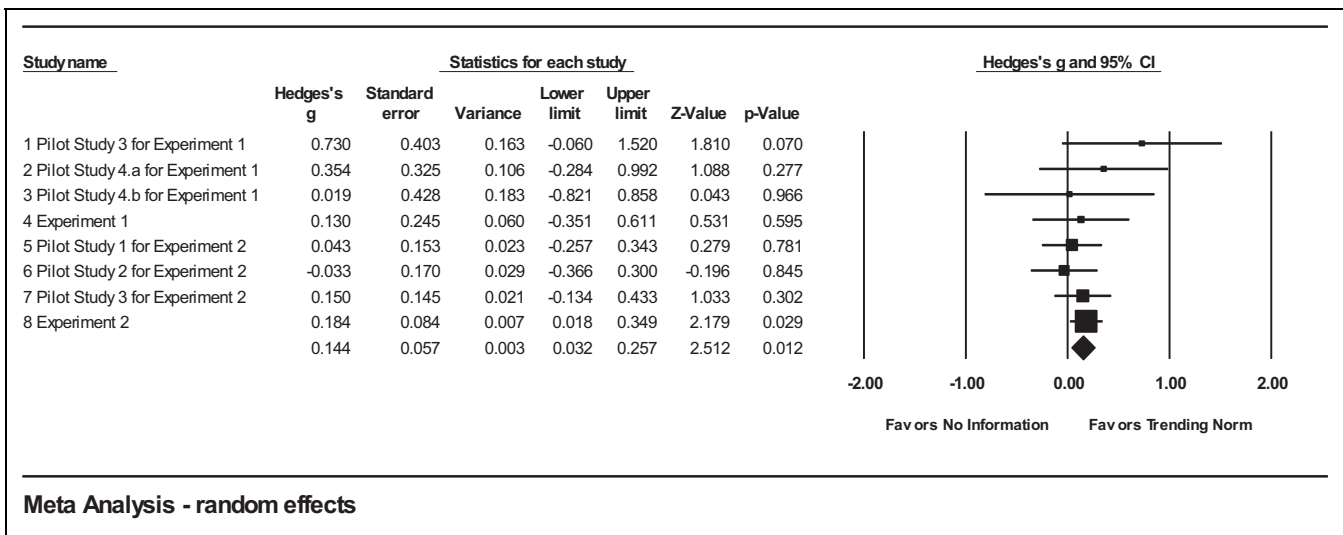
Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
1 Pilot Study 1 for Experiment 1	0.773	0.354	0.125	0.079	1.467	2.182	0.029
2 Pilot Study 2 for Experiment 1	0.053	0.259	0.067	-0.454	0.561	0.206	0.837
3 Pilot Study 3 for Experiment 1	0.728	0.383	0.147	-0.024	1.479	1.898	0.058
4 Pilot Study 4a for Experiment 1	-0.052	0.314	0.099	-0.667	0.563	-0.165	0.869
5 Pilot Study 4b for Experiment 1	0.178	0.302	0.091	-0.414	0.770	0.591	0.555
6 Experiment 1	0.588	0.249	0.062	0.101	1.076	2.364	0.018
7 Pilot Study 3 for Experiment 2	0.371	0.149	0.022	0.079	0.663	2.491	0.013
8 Experiment 2	0.228	0.084	0.007	0.063	0.394	2.713	0.007
	0.294	0.071	0.005	0.154	0.433	4.124	0.000

Figure 5. Meta-analysis of trending norm conditions compared to no information control conditions.

Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
1 Pilot Study 3 for Experiment 1	0.730	0.403	0.163	-0.060	1.520	1.810	0.070
2 Pilot Study 4.a for Experiment 1	0.354	0.325	0.106	-0.284	0.992	1.088	0.277
3 Pilot Study 4.b for Experiment 1	0.019	0.428	0.183	-0.821	0.858	0.043	0.966
4 Experiment 1	0.130	0.245	0.060	-0.351	0.611	0.531	0.595
5 Pilot Study 1 for Experiment 2	0.043	0.153	0.023	-0.257	0.343	0.279	0.781
6 Pilot Study 2 for Experiment 2	-0.033	0.170	0.029	-0.366	0.300	-0.196	0.845
7 Pilot Study 3 for Experiment 2	0.150	0.145	0.021	-0.134	0.433	1.033	0.302
8 Experiment 2	0.184	0.084	0.007	0.018	0.349	2.179	0.029
	0.144	0.057	0.003	0.032	0.257	2.512	0.012

(e.g., Tuk, Zhang, & Sweldens, 2015). Additionally, on a mass scale, even small effects can have significant impacts. For example, decreasing water consumption by just 8.7% reduces weekly water consumption by 217 gallons per household (Jaeger & Schultz, 2017).

Not all individual studies demonstrated statistical significance, but meta-analytic tests of heterogeneity showed no reliable differences in the magnitude or direction of effects. When taking the meta-analytic approach employed here, it is preferable to focus on the overall effect rather than questioning the presence of single studies that do not "work" (Braver et al., 2014; Maner, 2014), as across a program of research, it is improbable that a true effect will emerge significantly without exception (Lakens & Ets, in press; Schimmack, 2012).

General Discussion

One's behavior is guided by the behavior of others, but the behavior of others changes. The current research shows that though norms guide behavior, trends in norms also influence behavior. Our focal studies find that communicating increases in popularity cause more conformity than communicating popularity only, even when only a minority of people performs the behavior. As these two studies were culminations of two series of experiments, we analyzed all of our collected data in an internal meta-analysis, including studies with flawed methods that could weaken the effect. The meta-analysis found a trending norm produced significantly higher conformity than did a norm only (with an average effect size similar to both focal experiments) and a no norm control.

Limitations and Future Directions

The primary limitation of the research is that effect sizes were relatively small. However, even small effects can produce important outcomes on a large scale (e.g., the 8–10% increase in donations in Experiment 2 may be a "small" effect but could make a critical difference for a cause). Additionally, it is notable that this effect was found when communicating behaviors that differed from the target behaviors, even though doing so produces less conformity (Cialdini et al., 1990). Finding effects while focusing on behaviors that differ from the target behavior is of particular applicability to interventions aimed at communicating norms related to one desirable behavior (e.g., vandalism) to affect other, related behaviors (e.g., theft; Keizer et al., 2008).

We focused on minority norms to determine whether trend information could lead normative messages to be effective when they typically are not. However, this effect should not be limited to numerical minorities. In fact, trending norms may be *more* effective for behaviors already performed by the majority; across all of our studies, the largest effect size for trending norms ($g = .77$) was produced when majority norms were used (63% and 52% in Pilot Study 1 for Experiment 1; see Figure 4). This indicates that our meta-analysis may underestimate the true size of the trend effect across the full range of possible norms. Future research should further examine whether normative trends are more effective with behaviors already performed by a majority.

Although the effect was found both in the lab and online, and with student and community samples, future research should examine cultural limits of this effect. For example, the current research was limited to a Western sample, and whereas Westerners assume trends will continue, Easterners do not (Alter & Kwan, 2009; Ji, Nisbett, & Su, 2001).

Other limits of this effect should be explored as well. Although we found the effect when using numerical minorities, these minorities were on the cusp of becoming a majority. Would the effect remain when the behavior is more unpopular? Pilot Studies 1 and 2 for Experiment 2 do not show an effect with weaker minorities, but further testing is needed to better understand the effectiveness of trends across different levels of popularity.[6]

Finally, we examined the effect of trending norms on relatively benign, easy-to-implement, onetime behaviors, and we used manufactured trend information. It will be important for future research to test whether trending norms are still effective at larger scales, with more costly technologies, for more difficult behaviors, for major life decisions, and when using real data on a behavior's popularity. As an initial step, one study has shown that the likelihood of registering as an organ donor is significantly higher for people presented with a trending norm (44% of [religious peers] are currently listed on the National Donor Registry. *This increased from approximately 39% . . . in 2011*) than the norm only (Harper, Lemmon, Rocheleau, & Mortensen, 2016). Importantly, these percentages were genuine donation rates (Donate Life America, 2015), demonstrating the value of this research in real-life situations.

Conclusion

Normative messages are a subtle, simple, low-cost, and effective way to encourage compliance, but they are not without flaws. Normative messages may be ineffective or even backfire when a numerical minority engages in the behavior. The current research demonstrates that portraying a behavior as increasing in popularity can spur compliance even to minority norms. Trending norms may thus be a more effective way to encourage water conservation, environmental stewardship, and other desired behaviors.

Notes

1. Although we focus on the informational aspect of trending norms, other complimentary explanations for the influence of trends include the desire to get along with others and conform to others expectations (Cialdini et al., 1990; Deutsch & Gerard, 1955), as well as a desire to conform to groups upon which we base our identity (Hogg & Turner, 1987).
2. Without the covariate: $F(2, 96) = 3.15$, $p = .047$, $\eta_p^2 = .06$.
3. Without the covariate: $F(1, 96) = 5.70$, $p = .02$, $\eta_p^2 = .06$, 95% confidence interval (CI) [−0.262, −0.024].
4. Without the covariate: $F(1, 96) = 3.41$, $p = .07$, $\eta_p^2 = .03$, 95% CI [−0.008, 0.228].
5. These effects were similarly significant and marginally significant without the covariate.
6. Research conducted independently of our team has produced results comparable to ours using weaker minorities, but it differed from our research in that it compared a norm only (e.g., 30% rate) to a trend only (e.g., 30% increase; Sparkman & Walton, 2017).

References

Alter, A. L., & Kwan, V. S. Y. (2009). Cultural sharing in a global village: Extracultural cognition in European Americans. *Journal of Personality and Social Psychology*, *96*, 742–760. doi:10.1037/a0014036

Ariely, D., Loewenstein, G., & Prelec, D. (2003). "Coherent arbitrariness": Stable demand curves without stable preferences. *Quarterly Journal of Economics*, *118*, 73–105. doi:10.1017/cbo9780511618031.014

Asch, S. E. (1955). Opinions and social pressure. *Scientific American*, *193*, 31–35. doi:10.1038/scientificamerican1155-31

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to metaanalysis*. Chichester, England: Wiley. doi:10.1002/9780470743386

Boyd, R., Richerson, P. J., & Henrich, J. (2011). The cultural niche: Why social learning is essential for human adaptation. *Proceedings of the National Academy of Sciences*, *108*, 10918–10925.

Braver, S. L., Thoemmes, F. J., & Rosenthal, R. (2014). Continuously cumulating meta-analysis and replicability. *Perspectives on Psychological Science*, *9*, 333–342. doi:10.1177/17456916 14542784

Cialdini, R. B., Demaine, L. J., Sagarin, B. J., Barrett, D. W., Rhoads, K., & Winter, P. L. (2006). Managing social norms for persuasive impact. *Social Influence*, *1*, 3–15. doi:10.1080/15534510500181459

Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology*, *55*, 591–621. doi:10.1146/annurev.psych.55.090902.142015

Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and re-evaluation. *Advances in Experimental Social Psychology*, *24*, 201–234. doi:10.1016/S0065-2601(08)60330-5

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*, 1015–1026. doi:10.1037/0022-3514.58.6.1015

Cumming, G. (2012). *Understanding the new statistics: Effect sizes, confidence intervals, and meta-analysis*. New York, NY: Routledge. doi:10.4324/9780203807002

DeBono, A., Shmueli, D., & Muraven, M. (2011). Rude and inappropriate: The role of self-control in following social norms. *Personality and Social Psychology Bulletin*, *37*, 136–146. doi:10.1177/0146167210391478

Deutsch, M., & Gerard, H. B. (1955). A study of normative and informational social influences upon individual judgment. *Journal of Abnormal and Social Psychology*, *51*, 629–636.

Donate Life America. (2015). *2015 Annual update*. Retrieved from http://donatelife.net/wp-content/uploads/2015/09/DLA_Annual-Report_FINAL-for-onscreen-viewing.pdf

Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2007). Rooms for improvement. *Cornell Hotel and Restaurant Administration Quarterly*, *48*, 145–150.

Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2008). A room with a viewpoint: Using normative appeals to motivate environmental conservation in a hotel setting. *Journal of Consumer Research*, *35*, 472–482. doi:10.1037/e633912013-996

Harper, D., Lemmon, C. R., Rocheleau, C. A., & Mortensen, C. R. (2016, April). *To donate or not to donate? The role of normative trend data and religion on willingness to donate organs and tissues*. Poster presented at the Annual Convention of the Rocky Mountain Psychological Association, Denver, CO.

Hayes, A. F. (2012). *PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling* [White paper]. Retrieved from http://www.afhayes.com/public/process2012.pdf

Hogg, M. A., & Turner, J. C. (1987). Social identity and conformity: A theory of referent informational influence. In W. Doise & S. Moscovici (Eds.), *Current issues in European social psychology* (Vol. 2, pp. 139–182). Cambridge, England: Cambridge University Press.

Hubbard, T. L. (2015). The varieties of momentum-like experience. *Psychological Bulletin*, *141*, 1081–1119. doi:10.1037/bul0000016

Jacobson, R. P., Mortensen, C. R., & Cialdini, R. B. (2011). Bodies obliged and unbound: Differentiated response tendencies for injunctive and descriptive social norms. *Journal of Personality and Social Psychology*, *100*, 433–448. doi:10.1037/a0021470

Jacobson, R. P., Mortensen, C. R., Jacobson, K. J. L., & Cialdini, R. B. (2015). Self-control moderates the effectiveness of influence attempts highlighting injunctive social norms. *Social Psychological and Personality Science*, *6*, 718–726. doi:10.1177/1948550615578463

Jaeger, C. M., & Schultz, P. W. (2017). Coupling social norms and commitments: Testing the underdetected nature of social influence. *Journal of Environmental Psychology*, *51*, 199–208. doi:10.1016/j.jenvp.2017.03.015

Ji, L., Nisbett, R. E., & Su, Y. (2001). Culture, change and prediction. *Psychological Science*, *12*, 450–456. doi:10.1111/1467-9280.00384

Judd, C. M., Yzerbyt, V. Y., & Muller, D. (2014). Mediation and moderation. In H. Reis & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (2nd ed., pp. 653–676). Cambridge, England: Cambridge University Press.

Kallgren, C. A., Reno, R. R., & Cialdini, R. B. (2000). A focus theory of normative conduct: When norms do and do not affect behavior. *Personality and Social Psychology Bulletin*, *26*, 1002–1012. doi:10.1177/01461672002610009

Keizer, K., Lindenberg, S., & Steg, L. (2008). The spreading of disorder. *Science*, *322*, 1681–1685. doi:10.1126/science.1161405

Lakens, D., & Ets, A. J. (in press). Too true to be bad: When sets of studies with significant and non-significant findings are probably true. *Social Psychological and Personality Science*.

Maglio, S. J., & Polman, E. (2016), Revising probability estimates: Why increasing likelihood means increasing impact. *Journal of Personality and Social Psychology*, *111*, 141–158. doi:10.1037/pspa0000058

Maner, J. K. (2014). Let's put our money where our mouth is: If authors are to change their ways, reviewers (and editors) must change with them. *Perspectives on Psychological Science*, *9*, 343–351. doi:10.1177/1745691614528215

Markman, K. D., & Guenther, C. L. (2007). Psychological momentum: Intuitive physics and naive beliefs. *Personality and Social Psychology Bulletin*, *33*, 800–812. doi:10.1177/0146167207301026

Maxwell, S. E., Lau, M. Y., & Howard, G. S. (2015). Is psychology suffering from a replication crisis? What does "failure to replicate" really mean? *American Psychologist*, *70*, 487–498. doi:10.1037/a0039400

Milgram, S., Bickman, L., & Berkowitz, O. (1969). Note on the drawing power of crowds of different size. *Journal of Personality and Social Psychology*, *13*, 79–82. doi:10.1037/h0028070

Nadeau, R., Cloutier, E., & Guay, J. H. (1993). New evidence about the existence of a bandwagon effect in the opinion formation

process. *International Political Science Review*, *14*, 202–213. doi: 10.1177/019251219301400204

Neighbors, C., Larimer, M. E., & Lewis, M. A. (2004). Targeting misperceptions of descriptive drinking norms: Efficacy of a computer-delivered personalized normative feedback intervention. *Journal of Consulting and Clinical Psychology*, *72*, 434–447.

Neufeld, S. L., Griskevicius, V., Ledlow, S. E., Li, Y. J., Neel, R., Berlin, A., & Yee, C. (2012, January). *Going green to help your genes: The use of kin-based appeals in conservation messaging.* Paper presented at the Sustainability Psychology preconference of the annual meeting of the Society for Personality and Social Psychology, San Diego, CA.

Reich, J. W. (2008). Integrating science and practice: Adopting the Pasteurian model. *Review of General Psychology*, *12*, 365–377. doi:10.1037/1089–2680.12.4.365

Reno, R. R., Cialdini, R. B., & Kallgren, C. A. (1993). The transsituational influence of social norms. *Journal of Personality and Social Psychology*, *64*, 104–112. doi:10.1037/0022-3514.64.1.104

Robinson, E., Fleming, A., & Higgs, S. (2014). Prompting healthier eating: Testing the use of health and social norm based messages. *Health Psychology*, *33*, 1057–1064. doi:10.1037/a0034213

Schimmack, U. (2012). The ironic effect of significant results on the credibility of multiple-study articles. *Psychological Methods*, *17*, 551–566. doi:10.1037/a0029487

Schultz, P. W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. *Basic and Applied Social Psychology*, *21*, 25–36. doi:10.1207/15324839951036533

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*, 429–434. doi:10.1111/j.1467-9280.2007.01917.x

Sparkman, G., & Walton, G. M. (2017). Dynamic norms promote sustainable behavior, even if it is counternormative. *Psychological Science*, *28*, 1663–1674. doi:10.1177/0956797617719950

Tuk, M. A., Zhang, K., & Sweldens, S. (2015). The propagation of self-control: Self-control in one domain simultaneously improves self-control in other domains. *Journal of Experimental Psychology: General*, *144*, 639–654. doi:10.1037/xge0000065

Van Selst, M., & Jolicoeur, P. (1994). A solution to the effect of sample size on outlier elimination. *The Quarterly Journal of Experimental Psychology*, *47A*, 631–650. doi:10.1080/14640749408401131

Author Biographies

Chad R. Mortensen is an associate professor in the Department of Psychology at Metropolitan State University of Denver. His research focuses on social norms and conformity behavior as well as psychological responses to pathogen threats.

Rebecca Neel is an assistant professor of psychological and brain science at the University of Iowa. Her research focuses on social motivation, social judgment, and stigmatization.

Robert B. Cialdini is a Regents' Professor Emeritus of psychology and marketing at Arizona State University. His research areas include persuasion and social influence, which are the topics of his books *Influence* and *Pre-Suasion*.

Christine M. Jaeger graduated from California State University, San Marcos in December 2016 with an MA in psychological sciences. Her research focuses on applying social psychological theory to create implementable conservation interventions and to promote pro-environmental behavior.

Ryan P. Jacobson is an associate professor in the Department of Organizational Studies at the University of New Mexico's Anderson School of Management. His research focuses on normative social influence, multiculturalism, and the effects of morality on organizational behaviors.

Megan M. Ringel is a PhD student in psychology and social behavior at University of California, Irvine. Her research interests include social influence and persuasion, political psychology, motivated reasoning, morality, and social cognition.

Handling Editor: Dominique Muller