My Influence on the World (of Others): Goal Efficacy Beliefs and Efficacy Affect Predict Private, Public, and Activist Pro-environmental Behavior

Karen R. S. Hamann* and Gerhard Reese
University Koblenz-Landau

Efficacy beliefs are important drivers of human behavior. In the sustainability domain, self-, collective, and participatory efficacy tend to predict pro-environmental behavior (PEB). Yet, few studies consider efficacy actors and goals simultaneously, and it is uncertain whether specific efficacy beliefs are more or less predictive of specific PEB types (i.e., private, public, or activist). Therefore, we implemented a 2 × 2 plus baseline design (Study 1, N = 259), presenting participants with success stories and imagination tasks that highlighted either self- or collective efficacy (I vs. we) and either a direct or indirect goal (act environmentally friendly vs. encourage others to act). Although the manipulations did not affect goal efficacy beliefs or PEB intentions, goal efficacy beliefs and positive affect predicted PEB intentions, and specific efficacy behavior patterns occurred. Study 2 (N = 1,143) replicated most of the findings from Study 1: Self-efficacy predicted private PEB, and participatory efficacy predicted activist PEB. The relationship between collective efficacy and public PEB remains unclear. Our results highlight the importance of differentiating actors and goals in efficacy research and behavior types in general.

Climate change, resource depletion, and biodiversity loss are examples of human-made environmental problems that already have disastrous consequences for our planet and (human) life (Steffen et al., 2015). Although threatening climate change news can make us feel constantly helpless (Roser-Renouf, Maibach, Leiserowitz, & Zhao, 2014), we ask ourselves whether we “as individuals” can really make a difference in environmental protection and whether “our joint” actions can...
Table 1. Distinctions between Types of Efficacy and Types of PEBs with Example Items from Study 1

| Goal efficacy beliefs                                      | PEBs               |
|-----------------------------------------------------------|--------------------|
| Direct goal self-efficacy                                 | Private            |
| I as an individual can promote environmental protection   | Buy organic products|
| Indirect goal self-efficacy                               | Public             |
| I can encourage others to promote environmental protection| Voting             |
| Direct goal collective efficacy                           | Activist           |
| We as students can promote environmental protection       | Attend a protest   |
| Indirect goal collective efficacy                         |                    |
| We as students can encourage others to promote environmental protection | |

change anything. It is therefore crucial to investigate under which psychological conditions people feel capable to take action against climate change—and actually do so. We argue that efficacy beliefs may be a particularly relevant predictor of such actions and that some efficacy actors and goals are more promising for advancing environmental protection than others.

Self-efficacy is the belief that an individual actor is capable of attaining certain goals while collective efficacy refers to group members’ belief in the group’s capabilities to reach desired goals (Bandura, 1997). Based on Bandura’s (1997) self-efficacy theory, we propose an actor → behavior → goal link. Although Bandura focused on behavioral self-efficacy (individual actor → behavior) and distinguished it from outcome expectancy (behavior → goal), he described collective efficacy as rather goal oriented (group actor → goal). In the special case of environmental protection, goals are focal. Therefore, some studies in environmental psychology have also considered goal-oriented self-efficacy (actor → goal), sometimes termed as perceived effectiveness (Ginn & Lickel, 2020), political efficacy (Van Stekelenburg, Klandersmans, & Akkerman, 2016), or response efficacy (we refrain from this term because it is unclear who/what responds to whom/what in the environmental domain; Roser-Renouf, Maibach, Leiserowitz, & Zhao, 2014). Here, we use the term goal efficacy beliefs to describe this goal-focused type of perceived efficacy. Extending Hanss and Böhm’s (2010) notion that indirect efficacy goals such as “encouraging others to act environmentally friendly” can promote environmental intentions, we distinguish two goal categories: direct and indirect (see Homburg & Stolberg, 2006). Direct goal efficacy focuses on achieving a goal itself (e.g., strengthening animal rights); indirect goal efficacy explicitly involves an intermediate goal that serves a larger goal (e.g., convincing classmates to engage in animal rights action; see Table 1).
In the following, we summarize evidence on associations between goal efficacy beliefs and pro-environmental behaviors (PEBs). Because different sets of PEBs likely have different motivations (Lee, Kim, Kim, & Choi, 2014), we distinguish three types of PEBs (Stern, 2000): private-sphere environmentalism, nonactivist behavior in the public-sphere, and activist behavior (see Table 1 for examples). Goal self-efficacy is positively correlated with private (e.g., sustainable consumption; Doherty & Webler, 2016; Hanss & Böhm, 2010; Lee, Kim, Kim, & Choi, 2014; Reese & Junge, 2017), public (voting; Lee et al., 2014), and activist PEB (supporting an environmental group; Lee et al., 2014; Roser-Renouf et al., 2014). Moreover, Hanss and Böhm (2010) found that although indirect goal self-efficacy predicted private PEB intentions, direct goal self-efficacy predicted observed private PEB (i.e., sustainable incentive choice). Some studies have not found a direct link between goal self-efficacy and private or activist PEB when including other variables (diverse behaviors; Homburg & Stolberg, 2006; Wang & Lin, 2017), perhaps because collective problems, such as environmental pollution, may not always be seen as alterable by individual behavior. In fact, various authors have found that collective efficacy rather than self-efficacy better predicts private and activist PEB (diverse behaviors; Chen, 2015; Homburg & Stolberg, 2006). Further studies report correlations of collective efficacy with private (electric vehicle usage; Barth, Jugert, & Fritsche, 2016), public, and activist PEB (joining group meetings; Rees & Bamberg, 2014; for an overview, see Van Zomeren, Postmes, & Spears, 2008). Jugert et al. (2016) showed that collective efficacy was directly related to public PEB and indirectly related to private PEB via self-efficacy. However, in a study by Bamberg, Rees, and Seebauer (2015), collective efficacy did not predict intended and actual activist PEB (participation in a local environmental group), when participatory efficacy was included. The latter refers to the belief that an individual actor can make a significant difference in attaining a groups’ goal (Van Zomeren, Saguy, & Schellhaas, 2013).

Only a few experiments complement these correlational findings. For example, environmental framing (Steinhorst, Klöckner, & Matthies, 2015), pointing out the impact of collective PEBs (Jugert et al., 2016, Studies 1 and 2), or the salience of PEBs combined with information about their impact (Van Zomeren, Spears, & Leach, 2010) increased self-efficacy. Other methods, such as action advice (Hanss & Böhm, 2013) or presenting individual PEB as effective (Jugert et al., 2016, Study 4), did not. To our knowledge, collective efficacy was successfully manipulated by pointing out the impact of collective PEBs (Jugert et al., 2016; Van Zomeren, Spears, & Leach, 2010) and by providing medium—rather than too easy or too hard—task difficulty (Reese & Junge, 2017).

We also draw on qualitative findings that positive affective states of enthusiasm and confidence accompany PEBs like environmental activism (Drury, Cocking, Beale, Hanson, & Rapley, 2005). Although Jugert and colleagues (2016) did not find an association of general positive affect with PEB, more
efficacy-associated affects like “hope” were indeed related to it (Ojala, 2015). This finding reflects Bandura’s (1997) notion that general affective and physical states are associated with cognitive efficacy beliefs.

To summarize, goal self-efficacy mostly relates to private and activist PEB, and might be strengthened by an indirect goal focus. Collective efficacy appears to predict private, public, and activist PEB. To our knowledge, the current study is the first to investigate the relationship between various efficacy actors, goals, and PEB subtypes both experimentally and correlationally.

**Study 1**

Following our arguments above, we derived the following hypotheses: (1) Goal efficacy beliefs will predict PEB (intentions) above and beyond other predictors. (1a) Self-efficacy will better predict private PEB than will collective efficacy. (1b) Collective efficacy will better predict public and activist PEB than will self-efficacy. (1c) Indirect goal efficacy will better predict all types of PEB than will direct goal efficacy. (2) Positive affect will predict PEB (intentions).

**Method**

*Participants and Procedure*

Our sample consisted of 259 German university students (188 females, age $M = 21.66$ years, $SD = 2.58$). In May 2017, they were randomly assigned to one of five laboratory conditions in a $2 \times 2$ plus control group design. Participants in the four experimental conditions read slightly different artificial success stories about a sustainability challenge that took place in another German university city (for full text, see supplement A1 in Hamann & Reese, 2019).

Specifically, participants read stories about either “Mark” (self-efficacy) or a student group (collective efficacy) that managed to win the sustainability challenge by either reducing CO$_2$ emissions directly (direct goal efficacy) or by motivating others to do so (indirect goal efficacy). After a manipulation check containing questions about the text they just read, participants were instructed to think and write some notes about a question that fitted their success story condition, “How could you (vs. you jointly with others) act (vs. encourage people to act) environmentally friendly?” Subsequently, they completed our questionnaire on goal efficacy beliefs, PEB intention, positive affect, and covariates. Participants in the control group received the questionnaire immediately. At the end of the experiment, three PEBs were directly observed by our experimenters. In order to examine self-reported PEB, we conducted a posttest 1 week after the experiment, which was completed by 90 participants (72 females, $M_{age} = 21.69$ years, $SD_{age} = 2.42$, with 13 to 21 participants in each of the conditions).
Measures

Participants responded to all items on scales of 1 (totally disagree/incorrect) to 7 (totally agree/correct, see Supporting Information A13 for our complete questionnaire). One item of PEB intention and three items of PEB were excluded before scale construction because item–scale correlations were below .30.

Goal efficacy beliefs. Items were adapted from van Zomeren et al. (2010, 2013) and Hanss and Böhm (2010). Four items measured each of the four types of goal efficacy beliefs: direct goal self-efficacy ($\alpha = .66$), indirect goal self-efficacy ($\alpha = .78$), direct goal collective efficacy ($\alpha = .70$), and indirect goal collective efficacy ($\alpha = .72$). See Table 1 for exemplary items.

Positive affect. Our overall positive affect scale consisted of 10 PANAS items (Krohne, Egloff, Kohlmann, & Tausch, 1996) and two self-generated items chosen because of their special association with efficacy (i.e., motivated, hopeful, $\alpha = .91$).

PEB intention. Participants indicated whether they intended to act pro-environmentally privately (14 items, “In the future, I (still) intend to . . . use recycling paper if possible,” $\alpha = .77$), publicly (four items, “sign a petition for an environmental cause,” $\alpha = .74$), or engage in environmental activism (eight items, “organize a protest for environmental protection,” $\alpha = .91$). The overall scale of PEB intention contained 26 items ($\alpha = .91$) that were derived from several sources (Alisat & Riemer, 2015; Homburg & Stolberg, 2006; Jugert et al., 2016; Kaiser, Byrka, & Hartig, 2010; Van Zomeren et al., 2010).

Observed PEB. At the end of our experiment, we observed three PEBs. Participants were given the opportunity to choose an organic or nonorganic chocolate bar (private PEB), write their name on a mailing list of an environmental non-governmental organization [NGO] (public PEB), and take a sticker from the same NGO (representing activist PEB as it includes the possibility of encouraging others).

Self-reported PEB. A 1-week posttest inquired about participants’ PEBs during their last week. Intention items served as templates wherever they were transferable to a 1-week time range. We constructed a 12-item scale for private PEB ($\alpha = .82$). In order to prevent scale reliabilities below .60, public and activist PEB were combined into one scale (nine items, $\alpha = .76$).

Control variables. To test the additional explanatory value of goal efficacy beliefs, we further examined constructs that seemed especially relevant for the collective context of our study: identification with the group of students (three
items, $\alpha = .79$; Bamberg, Rees, & Seebauer, 2015), injunctive ($\alpha = .78$) and descriptive ($\alpha = .72$) norms with six items each (Rees & Bamberg, 2014), and demographics (age, gender, study program).

**Results**

We used R Statistics (v3.5.2) for data analysis and SPSS for data management. A trimmed dataset and script can be found on Open Science Framework (OSF; Hamann & Reese, 2019). Based on Mahalanobis distance, one multivariate outlier was excluded before analyses. Correlational analyses included all remaining participants; experimental tests only contained participants who passed our manipulation check ($N = 218$). We used regression to test H1 and H2 because our sample size did not allow tests of self-reported PEB or analyses including covariates in structural equation models [SEM]. Sub hypotheses comparing efficacy beliefs and positive affect, however, were only testable using SEM. Because of skewed distributions, we repeated every analysis with square-transformed scales and found results to be similar. To control for error accumulation in H1b/c, we used Bonferroni correction. A significant relation is signaled by $p < .025$ for H1b and $p < .017$ for H1c. Means, standard deviations, and correlations of scales can be found in the Supporting Information A2.

**Causal Hypotheses Testing**

Contrary to our expectations, there were no significant effects of the manipulations on either goal efficacy beliefs or PEB (intentions), all $ps > .30$. For individual tests and values, please see Supporting Information A3.

**Correlational Hypotheses Testing with Regression Analysis**

To test the overall associations of goal efficacy beliefs (H1) and positive affect (H2) with PEB, we calculated regression models for private, public, and activist PEB intention and self-reported PEB with all 258 participants (Models 4 and 5 did not include psychological covariates because of a small posttest sample size). Table 2 portrays best fitting models for each dependent variable using transformed scales. All PEB intentions and private PEB were significantly predicted by at least one type of goal efficacy belief, even when covariates were included (Models 1–4). Goal efficacy types varied in their degree of predictivity across intentions (from $b = .01$ to $b = .34$). Public and activist PEB was only marginally predicted by goal efficacy beliefs (Model 5). With regard to our second hypothesis, positive affect predicted PEB intentions ($b > .23$ for all), but not self-reported PEB. In a logistic
Goal Efficacy Beliefs Predict Pro-environmental Behavior

Table 2. Study 1 Hierarchical Regression Models with Transformed Scales Predicting Pro-environmental Intentions and Self-reported Behavior

| DVs          | (Model 1) private PEB intention | (Model 2) public PEB intention | (Model 3) activist PEB intention | (Model 4) private PEB & activist PEB |
|--------------|---------------------------------|---------------------------------|---------------------------------|--------------------------------------|
|              | $b$ | $t$     | $b$ | $t$     | $b$ | $t$     | $b$ | $t$     | $b$ | $t$     |
| Intercept    | $-$  | $(2.40)$ | $-$  | $(−0.89)$ | $-$  | $(−2.42)$ | $-$  | $(1.06)$ | $-$  | $(4.98)$ |
| Age          | $12^*$ | 2.20 | $10^*$ | 1.93 | $0.02$ | 0.04 | $0.17$ | 1.66 | $0.06$ | 0.61 |
| Gender       | $−0.10^j$ | $−1.83$ | $−0.01$ | $−0.22$ | $0.03$ | 0.70 | $−0.08$ | $−0.76$ | $0.17$ | 1.64 |
| Direct goal SE | $17^*$ | 2.22 | $0.01$ | 0.15 | $0.09$ | 1.39 | $0.01$ | 0.08 | $−0.06$ | $−0.34$ |
| Indirect goal SE | $16^j$ | 1.96 | $0.10$ | 1.26 | $23^{**}$ | 3.15 | $23$ | 1.63 | $28^j$ | 1.86 |
| Direct goal CE | $17^*$ | 2.10 | $24^{**}$ | 3.13 | $0.06$ | 0.90 | $34^*$ | 2.08 | $0.08$ | 0.48 |
| Indirect goal CE | $0.03$ | 0.40 | $0.09$ | 1.11 | $0.11$ | 1.47 | $−0.05$ | $−0.37$ | $0.26^j$ | 1.79 |
| Positive affect | $23^{***}$ | 4.04 | $23^{***}$ | 4.24 | $30^{***}$ | 5.95 | $22^j$ | 1.98 | $−0.02$ | $−0.15$ |
| Injunctive norms | $0.05$ | 0.61 | $30^{***}$ | 3.79 | $25^{***}$ | 3.46 |
| Descriptive norms | $0.02$ | 0.23 | $−0.08$ | $−0.99$ | $−0.09$ | $−1.29$ |
| Social identification | $−0.03$ | $−0.60$ | $−0.03$ | $−0.50$ | $0.01$ | 0.22 |

$R^2 = .362^{***}$  
$F(10, 245) = 13.89$  

$R^2 = .397^{***}$  
$F(10, 245) = 16.09$  

$R^2 = .485^{***}$  
$F(10, 245) = 23.09$  

$R^2 = .394^{***}$  
$F(7, 68) = 6.32$  

$R^2 = .268^{***}$  
$F(7, 80) = 4.18$

Note. For gender, positive values signify an association with male participants. Significant findings are displayed in bold. DV = dependent variable; IV = independent variable; SE = self-efficacy; CE = collective efficacy.

$p < .10$; $p < .05$; $p < .01$; $p < .001$. 

41
regression for observed PEB, only direct goal collective efficacy predicted choice of chocolate, \( OR = 1.72, p = .03 \) (see Supporting Information A4).\(^1\)

**Confirmatory Factor Analysis**

To test our assumption that both efficacy actors and efficacy goals can be distinguished, we first performed confirmatory factor analyses. A good fit is indicated by \( \chi^2/df < 3 \) (van Zomeren et al., 2013), a comparative fit index [CFI] > .90, a standardized root mean square residual [SRMR] < .08, and a lower value for the akaike information criterion [AIC]. The hypothesized model in which self-efficacy, collective efficacy, direct goal efficacy, and indirect goal efficacy represent distinct latent factors provided a better fit to the data, \( \chi^2/df = 1.90, \text{CFI} = .95, \text{SRMR} = .05, \text{AIC} = 12,028 \), than a model structured according to scales, \( \chi^2/df = 2.97, \text{CFI} = .87, \text{SRMR} = .06, \text{AIC} = 12,152 \), (see Table 1) a two factor models for self- and collective efficacy, \( \chi^2/df = 3.31, \text{CFI} = .84, \text{SRMR} = .07, \text{AIC} = 12,202 \), or a one-factor solution, \( \chi^2/df = 4.51, \text{CFI} = .74, \text{SRMR} = .21, \text{AIC} = 12,368 \). However, some factor loadings in the direct and indirect goal efficacy factor were nonsignificant and our hypothesized model had a low subject to free parameter ratio. Supporting Information A6 provides a figure on the CFA structure of efficacy beliefs.

**Correlational Hypotheses Testing with SEM**

To test our sub-hypotheses, we performed SEM using all-item-parcels on nontransformed scales as dependent variables. In order to compare predictive values of efficacy types, we compared a model that included both predictors (e.g., self- and collective efficacy) to models that included only one of those predictors with ANOVAs. Supporting H1a for private intention, model fit was better when including self-efficacy, \( \chi^2_{\text{diff}}(1) = 4.51, p = .034 \), but not collective efficacy, \( \chi^2_{\text{diff}}(1) = 1.45, p = .228 \). H1b was only partially supported. For public intention, model fit was better when including collective efficacy, \( \chi^2_{\text{diff}}(1) = 10.34, p = .001 \), and not self-efficacy, \( \chi^2_{\text{diff}}(1) = 0.98, p = .323 \), whereas for activist intention including self-efficacy, \( \chi^2_{\text{diff}}(1) = 14.43, p < .001 \), rather than collective efficacy, \( \chi^2_{\text{diff}}(1) = 1.51, p = .219 \), provided a better fit. Mixed results also appeared for H1c. For activist intention, both inclusion of indirect, \( \chi^2_{\text{diff}}(1) = 24.26, p < .001 \), and direct goal efficacy improved model fit, \( \chi^2_{\text{diff}}(1) = 21.57, p < .001 \). Yet, for private intention model fit was better when including direct goal efficacy, \( \chi^2_{\text{diff}}(1) = 27.20, p < .001 \), but not indirect goal efficacy, \( \chi^2_{\text{diff}}(1) = 0.10, \)

\(^1\)For more precise analyses that divides activist intention into participatory activist intention (e.g., protesting), volunteer activist intention (e.g., joining group meetings), and indirect PEB intention (e.g., encouraging fellow students), please see Supporting Information A5 and A7.
Goal Efficacy Beliefs Predict Pro-environmental Behavior

Fig. 1. Study 1 results of SEM showing association of goal efficacy beliefs with PEB intention. Separate model tests compare self-efficacy and collective efficacy in model a and direct and indirect goal efficacy in model b. Coefficients are standardized. *p < .10; †p < .05; **p < .01; ***p < .001.

\[ p = .748. \]

Regarding public intention, direct goal efficacy, \( \chi^2_{\text{diff}}(1) = 20.99, p < .001 \), but not indirect goal efficacy, \( \chi^2_{\text{diff}}(1) = 2.25, p = .133 \), led to a significant model fit increase (see Figure 1).

**Exploratory Analysis**

Regression analysis indicated that although our five PEB intention scales predicted self-reported private PEB, \( R^2 = .79, F(5, 70) = 51.70, p < .001 \), and public and activist PEB, \( R^2 = .55, F(5, 82) = 19.73, p < .001 \), they did not predict observed PEB (all \( ps > .05 \)). Furthermore, already environmentally active participants were more likely to answer our posttest; posttest participants were more likely to be involved in a sustainability initiative, \( t(141) = -2.40, p = .018 \), showed more T1 public PEB intention, \( t(189) = -2.69, p = .008 \), and T1 activist PEB intention, \( t(177) = -2.28, p = .024 \), compared to those not taking part in our posttest.

**Discussion**

In line with our expectations, goal efficacy beliefs predicted PEB intention, private self-reported, and private observed PEB (i.e., choice of taking an organic
chocolate) over and above other predictors. Surprisingly, neither self-reported nor observed public and activist PEB was related to goal efficacy beliefs. As predicted in H1a, self-efficacy was a better predictor of private intention than collective efficacy. Divergent to H1b, collective efficacy was only a better predictor of public intention, whereas for activist intention there was a trend favoring self-efficacy. Regarding H1c, only activist intention was predicted by an indirect goal efficacy. In fact, private and public intentions were significantly better predicted by a direct goal. In support of H2, positive affect predicted PEB intentions; however, it was neither related to self-reported nor observed PEB. The manipulation did not affect goal efficacy beliefs or PEB intentions.

Overall, Study 1 demonstrates the relevance of goal efficacy beliefs and efficacy affect for PEB intentions. A structural pattern emerged in which efficacy actors and goals could be differentiated. By focusing on nuanced relations considering Stern’s (2000) differentiation, our study provides first insights that specific actor–goal combinations match certain PEB types. We conducted a second study to confirm these insights.

Study 2

The main purpose of Study 2 was to confirm the factor structure of goal efficacy beliefs found in Study 1, and to replicate the matching of actor–goal efficacy beliefs and PEBs with self-reported actual (not intentional) PEB. Going beyond students, we chose another group identity for our collective efficacy measure that every participant could relate to, and which is relevant for environmental protection: identification with all humanity (Leung, Koh, & Tam, 2015; Reese, 2016).

Again, we hypothesized that (1) a factor structure of goal efficacy beliefs includes a self-efficacy, a collective efficacy, a direct goal efficacy, and an indirect goal efficacy factor. Furthermore, we expected that (2) private PEB would be positively predicted by self-efficacy and direct goal efficacy, (3) public PEB would be positively predicted by collective and direct goal efficacy, (4) activist PEB would be positively predicted by self-efficacy and indirect goal efficacy, and that (5) the same pattern would emerge for indirect PEB. Moreover, we expected that (6) participatory efficacy would predict activist PEB among environmental activists.

Method

Participants and Procedure

Data collection took place in April and May 2018. The data reported here is part of the first panel of a four-wave longitudinal study on environmental volunteers. For data acquisition, we used diverse platforms: university and environmental activist mailing lists, (environmental) Facebook groups, free survey
platforms, lottery platforms, and personal contacts. As an incentive, participants could win one of four 50€ or one 200€ voucher for Avocadostore, Amazon, or donate their prize to an NGO of their choice (only when completing all four questionnaires). We followed APA guidelines for ethical conduct of research, including informed consent as well as debriefing after the fourth questionnaire. Our final sample consisted of 1,143 participants (819 females, 309 males, $M_{age} = 30.95$ years, $SD_{age} = 11.49$). More than one third (37%) of participants were members of an environmental NGO.

Measures

First, we asked participants whether they were active members of an environmental NGO. Except for public and activist PEB, we measured all items on scales from 1 (totally disagree/never) to 7 (totally agree/always). Public and activist PEB were measured on a scale ranging from 1 (never) to 5 (often). Questions are in Supporting Information A14.

Goal efficacy beliefs. As in Study 1, items were adapted from van Zomeren et al. (2010, 2013) and Hanss and Böhm (2010). With a strict time limit and more efficacy constructs in Study 2, three items each measured direct goal self-efficacy ($\alpha = .83$, “I believe that I as an individual can advance environmental protection”), indirect goal self-efficacy ($\alpha = .88$, “I believe that I as an individual can encourage others to advance environmental protection”), direct goal collective efficacy of humanity ($\alpha = .85$, “I believe that we as humanity can advance environmental protection”), and indirect goal collective efficacy of humanity ($\alpha = .90$, “I believe that we as humanity can encourage one another to advance environmental protection”). Moreover, members of an NGO received three items each assessing direct goal collective efficacy of their NGO ($\alpha = .85$, “I believe that we as members of the environmental initiative can advance environmental protection”), indirect goal collective efficacy of their NGO ($\alpha = .87$, “I believe that the environmental actions of our environmental initiative can motivate others to do the same”), and participatory efficacy in their NGO ($\alpha = .82$, “I believe that I make a significant contribution to my environmental initiative in order to jointly advance environmental protection”).

Self-reported PEB. We measured PEB with several items adapted from Study 1. Two private PEB items were excluded beforehand because of participants’ comments that they were ambiguous and another two items because item–scale correlations were below .30. Our private PEB scale thus contained 18 items

---

2 As this study was part of a larger longitudinal study, our questionnaire contained additional items that are not relevant to the present paper.
(α = .78, “In the past three months, I . . . took a car to drive in or into the city”).

Public PEB was measured with four items (α = .74, “signed a petition for an environmental cause”), activist PEB with 12 items (α = .86, “organized an environmental protest”), and indirect PEB with three items (α = .87, “discussed environmental protection with friends and family”).

Results

Data analyses were performed with R Statistics version 3.6.0 and data management with SPSS. A trimmed dataset and script can be found on OSF. Based on Mahalanobis distance, nine multivariate outliers were excluded before analyses. Because of skewed distributions, we repeated every analysis with square-transformed scales and found results to be similar. To control for error accumulation, we used a Bonferroni correction. A significant relation was signaled by ps < .025 for H2–5. A correlation table and visualizations with Gaussian plots can be found in Supporting Information A8–A10.

Confirmatory Factor Analysis

To replicate our assumption that both efficacy actors and efficacy goals can be distinguished, we first performed a CFA on efficacy items that were answered by all participants. Supporting H1, a model in which self-efficacy, collective efficacy, direct goal efficacy, and indirect goal efficacy represented distinct latent factors provided a better fit to the data, $\chi^2/df = 5.17$, CFI = .973, SRMR = .030, AIC = 34,835 (see Figure 2), than a model structured according to scales, $\chi^2/df = 4.87$, CFI = .968, SRMR = .031, AIC = 34,882, $\chi^2_{diff}(8) = 31.53$, $p < .001$, or a one-factor solution, $\chi^2/df = 36.87$, CFI = .658, SRMR = .135, AIC = 37,603, $\chi^2_{diff}(14) = 1469.50$, $p < .001$.

In a model specifically for NGO members, we added a latent factor for participatory efficacy and incorporated collective efficacy concerning activists’ NGO either into already existing latent factors or as separate scales. Both a latent factor model, $\chi^2/df = 2.35$, CFI = .949, SRMR = .038, AIC = 22,411, and a scale model, $\chi^2/df = 2.23$, CFI = .949, SRMR = .039, AIC = 22,418, showed a good fit that did not differ significantly, $\chi^2_{diff}(6) = 5.49$, $p = .483$.

SEM Overall Sample

As in Study 1, we separately looked at effects of (a) self-efficacy and collective efficacy, and (b) direct and indirect goal efficacy. Our large sample size allowed us to compare effect sizes by contrasting an unrestricted regression model to a
parallel regression model (with similar regression coefficients for both constructs, see Figure 3).

Supporting H2, self-efficacy but not collective efficacy predicted private PEB, $\chi^2_{\text{diff}}(1) = 35.14, p < .001$; yet contrary to H2, indirect and not direct goal efficacy emerged as a significant predictor of private PEB, though their effects did not differ significantly, $\chi^2_{\text{diff}}(1) = 0.93, p = .336$. In contrast to H3, collective efficacy negatively predicted public PEB, whereas self-efficacy was a positive predictor, thus producing differing effects, $\chi^2_{\text{diff}}(1) = 44.22, p < .001$, and effects of direct and indirect efficacy did not differ, $\chi^2_{\text{diff}}(1) = 1.52, p = .218$. In accordance with H4, self-efficacy predicted activist PEB positively, whereas this time collective efficacy presented itself as a negative predictor, $\chi^2_{\text{diff}}(1) = 558.29, p < .001$. Concerning efficacy goals, indirect goal efficacy positively predicted activist PEB, and was a significantly better predictor than direct goal efficacy, $\chi^2_{\text{diff}}(1) = 3.91, p = .048$ (effect does not pass Bonferroni correction). Confirming H5, self- but not collective efficacy, $\chi^2_{\text{diff}}(1) = 58.24, p < .001$, and indirect but not direct goal efficacy, $\chi^2_{\text{diff}}(1) = 17.49, p < .001$, predicted indirect PEB. Note that public and activist PEB could hardly be explained by direct and indirect efficacy beliefs ($R^2 < .03$ for both) and that regression analyses showed indirect goal self-efficacy to best predict all PEBs (see Supporting Information A11).
Fig. 3. Study 2 results of SEM showing association of goal efficacy beliefs with PEBs. Separate model tests compare self-efficacy and collective efficacy in model a and direct and indirect goal efficacy in model b. Coefficients are standardized. †p < .10; *p < .05; **p < .01; ***p < .001.

**SEM Activist Sample**

For NGO member analyses, we included NGO participatory efficacy and NGO collective efficacy into our model (the latter was also integrated in our direct and indirect goal efficacy factors). Confirming H6, participatory efficacy significantly predicted activist PEB, $b = .20$, 95% CI [.08, .32], $\beta = .27$, $p = .002$. Post hoc analyses (see Supporting Information Figure A12) showed that activist PEB was also predicted by self-efficacy, $p = .041$, and that participatory efficacy also predicted public PEB, $p = .005$. As in the overall analysis, collective efficacy of humanity was again a negative predictor of activist, $p = .001$, and public PEB, $p = .033$. Collective efficacy of NGO did not predict any PEB ($p < .05$ for all), and self-efficacy was the only predictor of private, $p = .025$, and indirect PEB, $p < .001$, in this sample.

**Discussion**

The aim of Study 2 was to confirm our proposed factor structure of efficacy beliefs and to replicate efficacy–PEB relations found in Study 1. Although goal
efficacy beliefs hardly predicted actual self-reported behavior in Study 1, they did in study 2. As in Study 1, self-efficacy was also a better predictor of private, activist, and indirect PEB. Yet this time, direct and indirect goal efficacy only differed regarding indirect PEB (see H2/4/5). As opposed to study 1 and H3, self-efficacy turned out to be a positive predictor of public PEB, whereas collective efficacy (of humanity) negatively predicted public and activist PEB. Supporting H6, participatory efficacy predicted activist PEB in a sample of NGO members. In sum, Study 2 confirms many patterns of Study 1 but also raises some questions for future analyses.

**General Discussion**

We reported two studies that test the specific role of efficacy actors and goals on diverse PEBs. Although the manipulation in Study 1 did not affect PEB intentions or goal efficacy beliefs, both studies showed that efficacy actors and goals can be differentiated. Indeed, self- rather than collective efficacy predicted private and indirect PEB. Activist PEB was best predicted by self-efficacy (non-activist samples) and participatory efficacy (activist sample). Public PEB revealed diverging findings. In Study 1, it was positively predicted by collective efficacy (of students), whereas in Study 2 it was positively predicted by self-efficacy and negatively predicted by collective efficacy (with all humanity).

Several points are noteworthy. First, for private, activist, and indirect PEB, our results strongly support research in favor of self-efficacy (e.g., Doherty & Webler, 2016; Lee et al., 2014). Even when entering participatory efficacy beliefs in an active NGO member sample, self-efficacy remained the only predictor of private and indirect PEB, and still predicted activist PEB to a moderate degree. Our finding that participatory efficacy strongly predicts activist PEB among NGO members also substantiates former research (e.g., Bamberg et al., 2015; Van Zomeren et al., 2013).

Findings on collective efficacy were surprising. Although collective efficacy of students was the only predictor of public PEB in Study 1 (see Jugert et al., 2016), collective efficacy of humanity turned out to be a negative predictor of public and activist PEB in Study 2, and collective efficacy of activists’ NGO did not have any predictive power (see Bamberg et al., 2015; Van Zomeren et al., 2013). A potential explanation might be Olson’s (1968) paradox stating that collective efficacy could eventually lead to inaction because a single member’s behavior is unnecessary for goal achievement. Maybe, Olson’s proposal is mostly true for bigger groups, such as “all humanity.” Another explanation could be that only groups with pro-environmental in-group norms have the potential for collective efficacy effects. Although among students, environmentally friendly injunctive norms are very common, this is definitely not the case for all humanity. Moreover, items for public intention in Study 1 (e.g., voting) were less activism focused than
public PEB items in Study 2 (e.g., pay NGO membership fees). Hence, research examining a clear-cut differentiation of nonactivist PEB in the public-sphere and activist PEB is urgently needed.

Intriguingly, we found distinct effects of direct and indirect goal efficacy on PEB in Study 1 but not in Study 2. The only common pattern of both studies was that indirect PEB was positively predicted by indirect goal efficacy, which is hardly surprising as both are specified with similar behaviors (e.g., encourage others/discuss with others). Yet, regression analyses in Study 2 still highlighted that indirect goal self-efficacy was the most important predictor for all PEB subtypes (see Hanss & Böhm, 2010). We therefore suggest that, where there is no relevant common social identity for investigating participatory efficacy, it might be useful to focus on indirect goal self-efficacy.

In accordance with former research on positive affect in the environmental domain (Ojala, 2015; but see Jugert et al., 2016), positive affect emerged as a highly significant predictor of all PEB intentions in Study 1, possibly because we included two additional items that explicitly focused on efficacy-associated affects (i.e., feeling motivated/hopeful). Future studies should explore whether empowerment research could be expanded by introducing efficacy-associated affects (Drury, Cocking, Beale, Hanson, & Rapley, 2005).

Finally, the question remains why our manipulation in Study 1 did not affect our dependent variables. First, it may be difficult to increase goal efficacy believes. Few studies have managed to do so (e.g., Van Zomeren et al., 2010), many have not (e.g., Hanss & Böhm, 2013). Second, it is possible that for some participants, goal efficacy decreased because they noticed their own low impact for environmental protection in our imagination task. Moreover, it might have been useful to increase student identity salience for an effective manipulation of collective efficacy (Jugert et al., 2016). In fact, a stronger student identification appeared in our baseline group. This finding may be a result of our manipulation: Possibly, participants in the experimental groups refrained from identifying with their own unsustainable university to a certain degree. This may have influenced other aspects of our study. Finally, perhaps participants did not believe our cover story or did not identify with “Mark” (as a male actor).

One could criticize that some of our Study 1 goal efficacy scales only had tolerable reliabilities; however, this issue often occurs when self-efficacy items are phrased diversely (Homburg & Stolberg, 2006). Another critical point is that some of our Study 1 models had a low subject to free parameter ratio. However, our sample size was larger than 200 participants (Jackson, 2001) and we exceeded a 5:1 ratio in Study 2 (Tanaka, 1987). In Study 2, our overall sample was probably relatively environmentally conscious. Yet, this sample characteristic was necessary for investigating participatory efficacy and we checked every analysis with a nonactivist subsample.
Conclusion and Practical Implications

Taken together, our studies show that goal efficacy beliefs predict PEBs. They raise awareness for the many dimensions that might be involved when we use and speak of efficacy beliefs and behaviors in the context of environmental protection—including affectional states. The fact that some results are contradictory shows that this field of research is still in the early stages. Hopefully, future researchers profit from more precise hypotheses that can be deduced as a result of the present research. For practitioners and politicians, some recommendations can be derived. Our study suggests the importance of focusing on the individual when targeting private behavior (“you can protect the environment by buying organic food”). However, to motivate people to join an NGO or encourage their friends and family, campaigns should highlight statements such as “you can cause snowball effects.” For active NGO members, it is crucial to let them feel that they can actually make a difference. Creating a situation where people feel enthusiastic and strong seems useful in any case.

Acknowledgements

The authors would like to thank Sebastian Neubert, Laura Loy, and Marlis Wullenkord for their constructive feedback on a previous version of this manuscript, and the anonymous reviewers for their thorough comments. Moreover, we thank Chantal Krumm, Lara Kerschl, and Christoph Dolderer for their assistance in the process of data collection.

References

Alisat, S., & Riemer, M. (2015). The environmental action scale: Development and psychometric evaluation. *Journal of Environmental Psychology, 43*, 13–23. https://doi.org/10.1016/j.jenvp.2015.05.006

Bamberg, S., Rees, J., & Seebauer, S. (2015). Collective climate action: Determinants of participation intention in community-based pro-environmental initiatives. *Journal of Environmental Psychology, 43*, 155–165. https://doi.org/10.1016/j.jenvp.2015.02.002

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Barth, M., Jugert, P., & Fritsche, I. (2016). Still underdetected—Social norms and collective efficacy predict the acceptance of electric vehicles in Germany. *Transportation Research Part F: Traffic Psychology and Behaviour, 37*, 64–77. https://doi.org/10.1016/j.trf.2015.11.011

Chen, M.-F. (2015). Self-efficacy or collective efficacy within the cognitive theory of stress model: Which more effectively explains people’s self-reported pro-environmental behaviour. *Journal of Environmental Psychology, 42*, 66–75. https://doi.org/10.1016/j.jenvp.2015.02.002

Doherty, K., & Wehler, T. (2016). Social norms and efficacy beliefs drive the alarmed segment’s public-sphere climate actions. *Nature Climate Change, 6*, 1–8. https://doi.org/10.1038/NCLIMATE3025

Drury, J., Cocking, C., Beale, J., Hanson, C., & Rapley, F. (2005). The phenomenology of empowerment in collective action. *British Journal of Social Psychology, 44*, 309–328. https://doi.org/10.1348/014466604X18523
Hamann, K. R. S., & Reese, G. (2019). My influence on the world (of others): Supplements, data, and script. Open Science Framework. https://doi.org/10.17605/OSF.IO/UBJC3

Hanss, D., & Böhm, G. (2010). Can I make a difference? The role of general and domain-specific self-efficacy in sustainable consumption decisions. *Umweltpsychologie*, 14, 46–74.

Hanss, D., & Böhm, G. (2013). Promoting purchases of sustainable groceries: An intervention study. *Journal of Environmental Psychology*, 33, 53–67. https://doi.org/10.1016/j.jenvp.2012.10.002

Homburg, A., & Stolberg, A. (2006). Explaining pro-environmental behavior with a cognitive theory of stress. *Journal of Environmental Psychology*, 26, 1–14. https://doi.org/10.1016/j.jenvp.2006.03.003

Jackson, D. L. (2001). Sample size and number of parameter estimates in maximum likelihood confirmatory factor analysis: A Monte Carlo investigation. *Structural Equation Modeling*, 8, 205–223. https://doi.org/10.1207/S15328007SEM0802_3

Jugert, P., Greenaway, K. H., Barth, M., Büchner, R., Eisentraut, S., & Fritsche, I. (2016). Collective efficacy increases pro-environmental intentions through increasing self-efficacy. *Journal of Environmental Psychology*, 48, 12–23. https://doi.org/10.1016/j.jenvp.2016.08.003

Kaiser, F. G., Byrka, K., & Hartig, T. (2010). Reviving Campbell’s paradigm for attitude research. *Personality and Social Psychology Review*, 14, 351–367. https://doi.org/10.1177/1088868310366452

Krohne, H. W., Egloff, B., Kohlmann, C.-W., & Tausch, A. (1996). Untersuchung mit einer deutschen Version der “Positive and Negative Affect Schedule” (PANAS). *Diagnostica*, 42, 139–156.

Lee, Y.-k., Kim, S., Kim, M.-s., & Choi, J.-g. (2014). Antecedents and interrelationships of three types of pro-environmental behavior. *Journal of Business Research*, 67, 2097–2105. https://doi.org/10.1016/j.jbusres.2014.04.018

Leung, A. K. Y., Koh, K., & Tam, K. P. (2015). Being environmentally responsible: Cosmopolitan orientation predicts pro-environmental behaviors. *Journal of Environmental Psychology*, 43, 79–94. https://doi.org/10.1016/j.jenvp.2015.05.011

Ojala, M. (2015). Hope in the face of climate change: Associations with environmental engagement and student perceptions of teachers’ emotion communication style and future orientation. *The Journal of Environmental Education*, 46, 133–148. https://doi.org/10.1080/00958964.2015.1021662

Olson, M. (1968). *The logic of collective action: Public goods and the theory of groups*. Cambridge, MA: Harvard University Press.

Rees, J. H., & Bamberg, S. (2014). Climate protection needs societal change: Determinants of intention to participate in collective climate action. *European Journal of Social Psychology*, 44, 466–473. https://doi.org/10.1002/ejsp.2032

Reese, G. (2016). Common human identity and the path to global climate justice. *Climatic Change*, 134, 521–531. https://doi.org/10.1007/s10584-015-1548-2

Reese, G., & Junge, E. A. (2017). Keep on rockin’ in a (plastic-)free world: Collective efficacy and pro-environmental intentions as a function of task difficulty. *Sustainability*, 9, 200. https://doi.org/10.3390/su9020200

Roser-Renouf, C., Maibach, E. W., Leiserowitz, A., & Zhao, X. (2014). The genesis of climate change activism: From key beliefs to political action. *Climate Change*, 125, 163–178. https://doi.org/10.1007/s10584-014-1173-5

Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., et al. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223), 1259855. https://doi.org/10.1126/science.1259855

Steinhorst, J., Klöckner, C. A., & Matthies, E. (2015). Saving electricity—For the money or the environment? Risks of limiting pro-environmental spillover when using monetary framing. *Journal of Environmental Psychology*, 43, 125–135. https://doi.org/10.1016/j.jenvp.2015.05.012

Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56, 407–424. https://doi.org/10.1111/0022-4537.00175

Tanaka, J. S. (1987). “How big is big enough?”: Sample size and goodness of fit in structural equation models with latent variables. *Child Development*, 58, 134–146. https://doi.org/10.2307/1130296
Van Stekelenburg, J., Klandersmans, B., & Akkerman, A. (2016). Does civic participation stimulate political activity? *Journal of Social Issues, 72*, 286–314. https://doi.org/10.1111/josi.12167

Van Zomeren, M., Postmes, T., & Spears, R. (2008). Toward an integrative social identity model of collective action: A quantitative research synthesis of three socio-psychological perspectives. *Psychological Bulletin, 34*, 504–535. https://doi.org/10.1037/0033-2909.134.4.504

Van Zomeren, M., Saguy, T., & Schellhaas, F. M. H. (2013). Believing in “making a difference” to collective efforts: Participative efficacy beliefs as a unique predictor of collective action. *Group Processes and Intergroup Relations, 16*, 618–634. https://doi.org/10.1177/1368430212467476

Van Zomeren, M., Spears, R., & Leach, C. W. (2010). Experimental evidence for a dual pathway model analysis of coping with climate crisis. *Journal of Environmental Psychology, 30*, 339–349. https://doi.org/10.1016/j.jenvp.2010.02.006

Wang, E. S.-T., & Lin, H.-C. (2017). Sustainable Development: The effects of social normative beliefs on environmental behavior. *Sustainable Development, 25*, 595–609. https://doi.org/10.1002/sd.1680

KAREN R. S. HAMANN is a PhD student in the Environmental Psychology Unit at the University Koblenz-Landau in Germany and a scholar of the German Federal Environmental Foundation.

GERHARD REESE is Professor of Environmental Psychology at the University of Koblenz-Landau in Germany, and is Head of the Environmental Psychology Unit.