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ORIGINAL PAPER

Can Meditation Help the Environment? Examining Cross-Sectional Associations Between Meditation Goals and Outcomes in Experienced and Novice Meditators

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Abstract

Objectives This study examined (1) differences in meditation goals between novice and experienced meditators, (2) associations between meditation practice and outcomes in well-being and pro-environmental behavior (PEB), and (3) the predictive value of meditation goals for well-being and PEB. We assumed that different goals—self-regulation (e.g., stress management), self-exploration (e.g., self-reflection), and self-liberation (e.g., compassion)—are linked to distinct outcomes and may clarify prior inconsistent findings.

Method In a survey of 233 participants (102 novice and 131 experienced meditators), individuals reported their meditation goals, well-being, and pro-environmental behaviors.

Results While both novice and experienced meditators equally pursued self-regulation, experienced meditators reported significantly higher levels of self-exploration and self-liberation. Meditation practice was associated with higher mindfulness, more intention-based PEB, and lower CO_2 emissions from meat consumption, although not with general well-being or other ecological impact behaviors. Meditation goals showed unique associations with key outcomes beyond meditation practice: Self-regulation was negatively associated with mindfulness and well-being and positively associated with negative emotions. Self-liberation predicted more intention-based PEB and lower meat-related emissions, whereas self-exploration was associated with higher mindfulness, lower intention-based PEB, and higher emissions from meat consumption.

Conclusions The findings suggest that meditation goals differed depending on meditation experience and showed distinct associations with psychological well-being and PEB. These results highlight the relevance of motivational orientations in meditation for understanding differences in well-being and PEB.

Preregistration This study is not preregistered.

Keywords Meditation practice · Meditation goals · Pro-environmental behavior · Psychological well-being

The practice of meditation has become increasingly common among the general population (Cramer et al., 2016) and has been integrated into therapeutic settings and training programs, such as mindfulness-based programs, that aim to improve mindfulness skills and psychological well-being (Crane et al., 2017). Meditation encompasses a broad set of techniques, which can be classified along two dimensions (Matko & Sedlmeier, 2019): the level of activation (e.g., observation of the breath vs. inducing affective states) and the amount of body orientation (e.g., sitting in silence vs. meditation with movement). Mindfulness, in contrast, can be seen as a trainable skill—namely, paying attention to present-moment experiences in a non-judgmental way (Bishop et al., 2004; Kabat-Zinn, 1994) that can be trained through meditation (e.g., mindfulness meditation; Kabat-Zinn, 1994). Thus, meditation refers to the practice, mindfulness to a resulting skill.

Importantly, people meditate for different reasons (e.g., Sedlmeier & Theumer, 2020). Although improving mental health is a common motivation (Cramer et al., 2016), many also reported exploring inner experiences, developing

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spiritual insight, or cultivating compassion (e.g., Jiwani et al., 2022; Sedlmeier & Theumer, 2020). These goals may shape the effects of meditation, ranging from enhanced well-being and mindfulness skills to broader, other-oriented outcomes. For instance, meditation has been associated with increased prosocial emotions (Luberto et al., 2018) and empathy (Bibeau et al., 2016), and may foster a sense of care for the well-being of all living beings (Hanh, 2013; Shapiro, 1992). Thus, meditation may not only benefit the individual but also others, and, ultimately, society (Ericson et al., 2014; Wamsler et al., 2018).

With increasing awareness of the changing climate and its dramatic, life-threatening consequences (Intergovernmental Panel On Climate Change, 2023), research has explored how meditation may benefit society or even serve as guiding principles for public policy (Ericson et al., 2014). For instance, Thiermann and Sheate (2020) proposed that practicing meditation could enhance pro-environmental behaviors—actions that minimize harm to the environment and, ideally, provide benefits (Steg & Vlek, 2009). These behaviors are usually influenced by various internal factors, including, for example, beliefs and values, as well as external social and institutional contexts (e.g., Blankenberg & Alhusen, 2019). Among these internal factors, personality traits have repeatedly been shown to predict pro-environmental behavior, particularly traits like openness or agreeableness (e.g., Soutter et al., 2020).

Pro-environmental behaviors can be classified into intention-based and impact-based behaviors, depending on their actual environmental consequences (Fischer et al., 2012). Intention-based behaviors reflect individuals' subjective pro-ecological and social intentions that underlie the respective behaviors, but do not necessarily correspond to a measurable environmental impact (Fischer et al., 2012; Geiger et al., 2018). In contrast, impact-based behaviors are defined by their objectively measurable ecological effects, such as reduced CO_2 emissions from not owning a car or avoiding air travel (Geiger et al., 2018). In fact, a previous study has shown that people often overestimate the environmental impact of certain behaviors (e.g., switching off lights) (Attari et al., 2010). Even high school textbooks and government documents rarely recommended behaviors that have a higher objective impact, such as avoiding air travel or car ownership, to reduce an individual's greenhouse gas emissions (Wynes & Nicholas, 2017). This discrepancy between perceived and actual impact highlights the importance of differentiating between intention-based and impact-based behaviors when examining the environmental effects of individual actions (Fischer et al., 2012).

However, evidence on the relationship between meditation experience and pro-environmental behaviors is mixed. Comparisons between novice and experienced meditators generally have shown that experienced meditators report more environmentally friendly behavior (e.g., Loy & Reese, 2019; Panno et al., 2018; Thiermann & Sheate, 2021), including impact-based behavior measured as less CO_2 emissions from meat consumption (Thiermann et al., 2020), while others did not find an effect of meditation practice (Riordan et al., 2022). Intervention studies yielded similarly mixed results: While some reported increased pro-environmental behavior following meditation interventions (Loy et al., 2024; Ray et al., 2021), others found no effects (Böhme et al., 2018; Geiger et al., 2020; Riordan et al., 2022), only small effects (Böhme et al., 2018), or even negative effects (Le Houcq Corbi et al., 2024).

Finally, since mindfulness skills can also be developed while practicing meditation (Bishop et al., 2004), several existing studies have examined how these skills, often measured using trait questionnaires (e.g., Bergomi et al., 2014), were related to pro-environmental behavior. Yet, a meta-analysis of 12 articles found only weak associations between mindfulness facets and sustainable consumption (Geiger et al., 2019). While some additional cross-sectional research has linked mindfulness to higher self-reported pro-environmental behavior on the between-person level (Barbaro & Pickett, 2016) and within-person level (Richter & Hunecke, 2022), the overall evidence is inconsistent.

One possible explanation for these inconsistencies may lie in the variation of individual meditation goals, which may represent internal determinants for pro-environmental behavior. Meditation goals are closely tied to individual beliefs and values, as reflected by findings that showed that spirituality and personality traits can shape the reasons individuals report to meditate, potentially influencing the preferred meditation technique and the focus of the practice, such as feeling compassion or practicing mindfulness skills (Sedlmeier & Theumer, 2020). According to Shapiro (1992), individuals may pursue three overarching goals when meditating: self-regulation, self-exploration, and self-liberation. These goals are thought to evolve with practice and may determine what individuals achieve by meditating (Shapiro, 1992). However, it should be noted that Shapiro's findings are based on a small sample and thus serve as a preliminary framework rather than definitive evidence.

Initially, individuals often begin meditating to regulate emotions and manage stress (self-regulation), a goal reflected in programs like Mindfulness-Based Stress Reduction (Kabat-Zinn, 1994). As individuals gain experience, they may become more interested in understanding their internal experiences (self-exploration), which still focuses primarily on individual outcomes like improving mindfulness skills and psychological well-being. Evidence on this subject comes mostly from studies that did not explicitly assess individuals' meditation goals, finding positive effects of meditation interventions on individuals' mindfulness

(Eberth & Sedlmeier, 2012) and well-being, such as reduced anxiety and depression (e.g., Goyal et al., 2014).

Eventually, over time, individuals may shift toward the goal of self-liberation, which involves transcending ego boundaries and cultivating compassion for others (Shapiro, 1992; Walsh & Vaughan, 1980). This focus on others is thought to be essential for engaging in pro-environmental behavior: For example, Ulluwishewa (2019) argued that the reason for *un*sustainable behavior is the self-centeredness of individuals and the lack of connectedness to their environment. Furthermore, Thiermann and Sheate's (2020) two-pathway model suggested that through connectedness to nature, individuals' empathy and compassion can grow. This, in turn, should help to increase individuals' internalized goals to act in environmentally friendly ways (Thiermann & Sheate, 2020). In line with these assumptions, recent studies found that connectedness with others (which was called human identity in the original study) explained why meditators report more pro-environmental behavior (Loy & Reese, 2019). This was also the case for meditators trained in compassion meditation (Thiermann et al., 2020).

Taken together, these findings suggest that considering individuals' meditation goals, in addition to their meditation experience, may help explain divergent outcomes in previous research on pro-environmental behavior. Specifically, some goals, such as self-regulation and self-exploration, may be more strongly associated with individual outcomes, such as mindfulness skills and psychological well-being, while self-liberation might also predict behaviors that extend beyond oneself, such as pro-environmental behavior.

In the present cross-sectional study, we first examined whether and how novice and experienced meditators differed in pursuing different meditation goals. For conceptual clarity, the present work focused on the three main goals proposed by Shapiro (1992) that are suggested to shift from self-regulation to self-exploration and self-liberation with increasing meditation experience. Therefore, we expected to find different meditation goal patterns between novice and experienced meditators (Research Question 1). Second, we explored whether meditation experience was associated with (a) individual meditation outcomes, such as mindfulness skills and psychological well-being and (b) intention- and impact-based pro-environmental behaviors (Research Question 2), adding another data point to past research. Finally, we examined whether the three meditation goals would additionally and differently explain mindfulness and psychological well-being and pro-environmental behaviors beyond the effect of meditation experience (Research Question 3). To isolate the effects of meditation goals from other relevant internal predictors of pro-environmental behavior, we additionally controlled for personality traits.

In doing so, we aimed to understand whether the type of goal that motivates meditation is associated with meditation outcomes—regardless of how long individuals have practiced meditation. We hypothesized that the goals of self-regulation and self-exploration would be positively associated with individual outcomes like mindfulness and psychological well-being, but not necessarily with pro-environmental behavior. In contrast, we expected that the goal of self-liberation would be associated with mindfulness and psychological well-being, and pro-environmental behavior as individuals who strive for connectedness would also meditate to better understand and gain more clarity not only about themselves but also about others.

Method

Data were collected via an online survey conducted from March 23 to May 2, 2021, as part of a graduate project by the second author. The project aimed to examine whether different meditation goals explain the relationship between meditation experience and well-being, pro-environmental behavior, and CO_2 emissions. Only measures relevant to this paper are reported. The survey was approved by the ethics committee at the University of Mainz (2021-JGU-psychEK-S005). All data and measures can be accessed publicly (https://osf.io/mx36p/overview). The research questions and analyses were not preregistered and are therefore considered exploratory.

Sample Size

To detect medium-sized differences ($d = 0.35$) between novices/irregular and experienced/regular meditators and small- to medium-sized correlation coefficients ($r = 0.20$) (Loy & Reese, 2019), we aimed for a sample of at least 204 participants ($1-\beta = 0.80$ and $\alpha = 0.05$) based on an a priori G*Power analysis (Faul et al., 2007). Due to high dropout rates typical of online surveys (e.g., about 30% in Bosnjak & Tuten, 2001; Galesic, 2006), 326 participants were recruited, of whom 233 fully completed the online survey (71.5%). The final sample was on average 38.5 years old ($SD = 12.6$; range 18–70), predominantly female (85.8%), and varied in educational level (secondary school certificate [11.16%], high school diploma [28.33%], still studying [6.01%], having a bachelor's degree [24.46%], having a master's degree [27.04%], and having a doctoral degree [3%]). Based on the criteria proposed by Thiermann et al. (2020), we identified 102 participants as novice and irregular meditators (practicing less than one year and/or less than once a week) and 131 experienced meditators (practicing for at least 12 months and at least several times a week). We refer to these groups as novice and experienced meditators for simplicity.

Procedure

Participants were recruited via online platforms and social media groups, yoga studios, and the mailing list of the Institute of Psychology at the University of Mainz. In the advertisement, we informed all potential participants that they could take part in a study examining meditation experience and pro-environmental behavior by clicking a SoSci Survey link (Leiner, 2021), if they had fulfilled the following inclusion criteria: (1) some meditation experience (e.g., mindfulness meditation, concentrative meditation, objectless meditation, contemplative meditation, guided meditation, meditation that implements compassion or self-compassion, and body-focused meditation, such as yoga, Tai Chi, Qigong, or other martial arts sports that focus on mindful movements), (2) fluency in German, and (3) aged 18 or older. The survey, taking approximately 30 min to complete, included informed consent and multiple questionnaires. Psychology students could earn course credits, and all participants had the chance to win one of three online meditation courses worth 15 EUR.

Measures

Demographic and Meditation Practice Information

Participants provided data on age, gender, highest education, profession, and meditation practice experience (meditation practice experience in months, frequency of their meditation practice sessions, average duration of a meditation session in min, and the meditation style, which they could choose from different categories) along with dietary habits (vegan, vegetarian, pescatarian, or omnivore diet).

Big Five Personality

Given that previous research has found personality to be an important predictor of pro-environmental behavior (e.g., Soutter et al., 2020), we assessed Big Five personality traits as control variables using the BFI-10, a 10-item scale (Rammstedt & John, 2007) with items rated from 1 (*disagree strongly*) to 5 (*agree strongly*).

Meditation Goals

To assess individuals' goals to meditate, we used selected items from the *List of reasons for why people begin and continue to meditate* from Table 4 of the published paper by Sedlmeier and Theumer (2020). The German version of the items was requested from the authors and used in the present research. Instead of asking our participants to indicate both the initial reasons to engage in meditation in the first place and the reasons why they currently practiced meditation, we only asked them to report the current reasons, which they answered on a scale from 1 (*does not apply at all*) to 6 (*applies completely*).

To keep the scale both parsimonious and psychometrically sound, we aimed to include four items for each of the three goals provided by Shapiro (1992): self-regulation, self-exploration, and self-liberation. Based on theoretical considerations, we first selected candidate items from the broader pool provided by Sedlmeier and Theumer (2020). Items reflecting calming and stress reduction were assigned to self-regulation (e.g., "Calm down internally"), items capturing increased self-awareness and understanding of thoughts and feelings were assigned to self-exploration (e.g., "Perceive my current thoughts"); and items relating to social contribution, openness, and spiritual experience were assigned to self-liberation (e.g., "Open up my heart"). We then selected four items per goal that demonstrated the best model fit and confirmed this factor structure using confirmatory factor analysis to ensure the scale's validity. The final model showed relatively good fit indices, $\chi^2_{(51)} = 72.9$, $p = 0.024$, RMSEA = 0.04, CFI = 0.96, SRMR = 0.06, according to the guidelines by Hu and Bentler (1999). In addition, McDonald's omega reliability of all three scales was acceptable (self-regulation: $\omega = 0.74$; self-exploration: $\omega = 0.76$; self-liberation: $\omega = 0.76$). The full model and all items that were used can be found in the Online Resource (Fig. S1 and Table S1). We used the mean scores from each of the three scales in our further analyses.

Mindfulness

Given that mindfulness is an ability that is practiced through meditation, we assessed trait mindfulness as a proxy for the individuals' general tendency to use mindfulness skills in daily life. Mindfulness was measured using the *Comprehensive Inventory of Mindfulness Experiences* (Bergomi et al., 2014). The CHIME consists of 37 items (by mistake, we did not assess Items 21 and 31, so we calculated mean mindfulness with the remaining 35 items) that are answered on a Likert scale ranging from 1 (*almost never*) to 6 (*almost always*) and is divided into eight subscales to capture the complexity of mindfulness (inner awareness, outer awareness, acting with awareness, openness, acceptance, decentering/nonreacting, insight, relativity of thoughts). The overall mindfulness score showed very good reliability ($\omega = 0.93$).

Psychological Well-being

We used the German version of the PERMA-Profiler as a measure for psychological well-being (Butler & Kern, 2016; Wammerl et al., 2019). The scale consisted of 23 items and measures well-being across five domains: positive emotions, engagement, positive relationships, meaning, and

accomplishment. The PERMA also included eight filler items measuring the domains of negative emotions, health, loneliness, and overall happiness. All items were answered on an 11-point rating scale, ranging from 0 (*never*) to 10 (*always*) or 0 (*not at all*) to 10 (*completely*). We used the average score across the five PERMA subscales and overall happiness as an indicator for individuals' overall well-being (Wammerl et al., 2019) and additionally examined the domains health, negative emotions, and loneliness in relation to the meditation goals. Reliability of overall well-being ($\omega = 0.93$) and health ($\omega = 0.91$) was very good, and the reliability for negative emotions was acceptable ($\omega = 0.74$).

Intention-Based Behavior

We used eight items from the *Skala zur Messung von zentralen Kenngrößen des Umweltbewusstseins* [Measurement Instrument for the Assessment of Central Aspects of Environmental Awareness] (Appendix 10, Item 16 to 23 in Geiger & Holzhauer, 2020) to assess intention-based environmental behavior. Five items examined the frequency of behaviors on a scale from 0 (*never*) to 4 (*always*), such as riding a bike or going by bus to get to work. Additionally, three items were binary and assessed whether individuals engaged in a certain behavior, such as donating money (*yes* = 1 or *no* = 0). Please note that in the final version of the scale only one item was binary (ecological energy) and was originally recoded to 0 (*conventional energy*) and 4 (*ecological energy*) (Appendix 10 in Geiger & Holzhauer, 2020). Since we also assessed two other items on a binary scale, which was the case for an early version of the scale (Table 15 in Geiger & Holzhauer, 2020), we did the same with these two items to consistently reflect intention-based pro-environmental behavior on a scale from 0 (*no*) to 4 (*yes*). The mean across all items reflected intention-based behavior. The reliability of the intention-based behaviors was acceptable ($\omega = 0.66$).

Impact-Based Behavior: Estimated CO_2 Footprint

Additionally, we used items from the *Skala zur Messung von zentralen Kenngrößen des Umweltbewusstseins* (Geiger & Holzhauer, 2020) to assess five impact-based sustainable consumption behaviors: (1) meat consumption, (2) car ownership and use, (3) private air travel, (4) heating energy demand (living space per person multiplied by the energy demand standard), and (5) monthly electricity consumption. Based on how often individuals reported eating meat, whether they owned a car, how many kilometers they drove per year, how many times they travelled by plane, how much they paid monthly for electricity, and whether they used green electricity, whether they lived in a relatively old or new building, and how many square meters of living space they heated in winter, the CO_2 emissions in tonnes per year were estimated for each environmental domain (for details on how to estimate CO_2 emissions, see Geiger & Holzhauer, 2020). As we did not assess the number of people living in the same household, which is necessary to calculate heating energy demand and car use, we chose to use the average number of people living together in a household in Germany (1.99 persons in 2019, which we rounded to two persons; Statistisches Bundesamt, 2020). Overall, reliability for overall CO_2 emissions was poor ($\omega = 0.32$), which was also a reason to examine the different domains separately.

Data Analyses

All analyses were computed with Stata 18 (StataCorp., 2023).

Research Question 1: Analyses of Group Differences

To examine whether the tendency to pursue different meditation goals (self-regulation, self-exploration, and self-liberation) differed as a function of meditation experience, we conducted a mixed-effects model. The three goal types (self-regulation, self-exploration, self-liberation) were treated as a within-subjects factor (goal), and meditation experience (novice vs. experienced; binary variable) was included as a between-subjects factor. Data were first reshaped into long format, with each participant contributing three rows (one per goal). We then estimated a linear mixed-effects model predicting goal strength (value) from the interaction between goal type and meditation experience, including a random intercept for participants to account for the repeated-measures structure.

To test for overall interaction effects, we used the *contrast* command to examine simple and interaction contrasts. Estimated marginal means for each goal by group were obtained using the *margins* command. Post hoc pairwise comparisons between all combinations of goals and experience levels were conducted with Sidak correction for multiple testing. These analyses allowed us to determine whether certain meditation goals were more strongly endorsed depending on participants' level of meditation experience, and whether goal profiles differed between novice and experienced meditators.

Research Question 2: Examining Associations Between Meditation Experience and Outcome Variables

To find further evidence that meditation practice (experienced versus novice meditators) could predict individual meditation outcomes (mindfulness and psychological well-being) and intention- and impact-based pro-environmental behaviors, we computed path models using the *sem*

command, whose estimates can be interpreted as estimates from regression models. We chose these models because not all of our variables were normally distributed, and applying the Satorra-Bentler adjustments in a SEM makes the estimates robust to non-normality (Satorra & Bentler, 2001). Another advantage of using SEM to model these associations was that it allowed us to account for covariances in the independent variables, such as meditation goals.

First, we computed ten models predicting individual meditation outcomes (mindfulness, overall well-being, negative emotions, feelings of loneliness, and perceived health) and intent- as well as impact-based pro-environmental behaviors (five specific behaviors) by meditation practice (novice vs. experienced), using the Satorra-Bentler adjustments that are robust to non-normality (Satorra & Bentler, 2001). An exemplary model of Model 1 can be found in the Online Resource (Fig. S2).

Second, to ensure that the effect of meditation practice was not simply due to other differences between groups, we modelled an additional SEM with meditation practice as the independent variable and additional control variables on which the groups differed to predict the meditation outcomes (Model 2). Before that, we first tested whether the groups differed on the Big Five using five independent samples *t*-tests and using the traits that were found to differ between novice and experienced meditators as control variables. Also, given that connectedness is a potentially important goal of compassion meditation practice, and that novices and experienced meditators differed in whether they engaged in compassion meditation, we further used compassion meditation as a control variable. As a final additional control variable, we also included age since the two meditation groups significantly differed from each other in this regard. An exemplary model can be found in the Online Resource (Fig. S3).

Research Question 3: Testing the Incremental Predictive Value of Meditation Goals

Given that previous research has sometimes found null- or only small effects of meditation in predicting pro-environmental behavior, we then tested whether meditation goals could predict these outcomes by adding them to the models described above (control variables were also used in the full model that included meditation practice and the three meditation goals as independent variables) and interpreting the specific standardized coefficients (Model 3). An exemplary model can be found in the Online Resource (Fig. S4). To test whether they could explain additional variance in outcomes compared to just using meditation practice and the control variables as the independent variables, we used 500 bootstraps to test whether adding the goals to the model explained significantly more variance than the models without them.

Because some participants reported scores on the impact-based behaviors that were 3 *SD* above the sample mean (4 outliers for car use, 3 outliers for electricity use, 2 outliers for heating energy use, 1 outlier for meat consumption, and 7 outliers for travelling by plane), we tested in a last step whether the main findings regarding the associations between the meditation goals and the different outcomes remained significant when these individuals were excluded from the analyses.

Results

Descriptive statistics and zero-order correlations between goals to meditate and meditation outcomes can be found in Table 1. All sample characteristics and differences between groups are presented in Table 2.

Results of Research Question 1: Differences in Meditation Goals Between Novice and Experienced Meditators

The mixed-effects model revealed significant within-subject effects, $b = -0.74$, 95% CI [−0.88, −0.60], $p < 0.001$, and between-subject effects, $b = -0.70$, 95% CI [−1.13, −0.28], $p = 0.001$, indicating that meditation goals varied within and between novices and experienced meditators. In addition, the two-way interaction was significant, $b = 0.52$, 95% CI [0.33, 0.70], $p < 0.001$, suggesting that the pattern of meditation goals differed between novices and experienced meditators. To better understand this interaction effect, we extracted estimated marginal means from the model (Fig. 1) and compared them post hoc (Table 3).

As can be seen in Fig. 1 and Table 3, self-regulation was almost equally pursued in both novice and experienced meditators, with a small but non-significant difference between the groups. However, self-exploration and self-liberation were significantly less pursued by novice than by experienced meditators. Although self-regulation was significantly higher than self-liberation for experienced meditators, the effect size was only small and much smaller than the large effect size found for novices. In addition, self-regulation and self-exploration did not differ for experienced meditators, whereas novices pursued self-regulation more than self-exploration. While both novice and experienced meditators reported pursuing self-regulation to a large extent, experienced meditators reported pursuing self-exploration and self-liberation to a greater extent than novices.

Table 1 Descriptive statistics and intercorrelations between the three meditation goals and different meditation outcomes

Variable	*M* (*SD*)	*Md*	*Min*	*Max*	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Regulation	4.6 (1.1)	4.8	1	6														
2 Exploration	4.2 (1.2)	4.5	1	6	0.17**													
3 Liberation	3.7 (1.3)	3.8	1	6	0.03	0.48***												
4 Mindfulness	4.2 (0.6)	4.2	2.6	6	−0.30***	0.20**	0.26***											
5 Overall WB	8.4 (1.5)	8.8	3.4	10.8	−0.24***	0.10	0.18**	0.67***										
6 Health	8.2 (2.0)	8.7	2	11	−0.23***	0.11	0.17*	0.45***	0.60***									
7 Loneliness	4.7 (3.0)	4	1	11	0.14*	0.02	−0.11	−0.30***	−0.44***	−0.21**								
8 NE	4.5 (1.8)	4.3	1	9.7	0.32***	0.08	0.00	−0.51***	−0.54***	−0.43***	−0.37***							
9 Intention	2.4 (0.7)	2.4	0.6	4	0.03	0.01	0.23***	0.09	0.14*	0.16*	−0.03	0.01						
10 CO_2	5.5 (2.4)	5.1	1.9	16.6	0.06	−0.01	−0.04	0.09	0.01	0.09	−0.04	0.00	−0.15*					
11 CO_2 Plane	1.5 (1.5)	1.2	0	6.1	−0.06	0.02	−0.00	0.01	0.01	0.14*	0.08	−0.01	0.07	0.58***				
12 CO_2 Heat	1.2 (1.0)	1.0	0	10.6	0.10	−0.03	−0.01	0.06	−0.05	−0.03	−0.07	0.06	−0.09	0.59***	0.08			
13 CO_2 Electricity	0.3 (0.4)	0.1	0	2.8	0.11	0.07	−0.09	−0.06	−0.03	−0.03	0.01	0.11	−0.45***	0.23***	−0.08	0.14*		
14 CO_2 Car	1.1 (1.4)	0.9	0	11.5	0.06	−0.07	−0.01	0.11	0.06	0.05	−0.13	−0.07	−0.05	0.62***	−0.05	0.17**	0.04	
15 CO_2 Meat	1.4 (0.2)	1.4	1.2	2.3	0.04	0.12	−0.13*	0.09	−0.03	−0.08	0.10	0.01	−0.44***	0.21**	−0.04	0.10	0.15*	0.12

Overall WB overall well-being, *NE* negative emotions, *Intention* intention-based pro-environmental behavior, CO_2 estimated carbon dioxide emission in tonnes per year (impact-based behavior)

*$p < 0.05$

**$p < 0.01$

***$p < 0.001$

Table 2 Sample characteristics of novice as well as experienced meditators

Characteristic	Novice	Experienced	Difference
n	102	131	
Age, *M* (*SD*)	33.58 (11.54)	42.30 (12.17)	$t_{(231)} = -5.55$***, $d = -0.73$
Gender, *n* (%)			$\chi^2_{(1, 233)} = 0.30$
Female	89 (87.25)	111 (84.73)	
Male	13 (12.75)	20 (15.27)	
Mindfulness meditation, *n* (%)	72 (70.59)	111 (84.73)	$\chi^2_{(1, 233)} = 6.81$**
Concentrative meditation, *n* (%)	18 (17.65)	40 (30.53)	$\chi^2_{(1, 233)} = 5.09$*
Objectless meditation, *n* (%)	11 (10.78)	41 (31.30)	$\chi^2_{(1, 233)} = 13.92$***
Contemplative meditation, *n* (%)	3 (2.94)	26 (19.85)	$\chi^2_{(1, 233)} = 15.04$***
Guided meditation, *n* (%)	67 (65.69)	104 (79.39)	$\chi^2_{(1, 233)} = 5.51$*
Compassion meditation, *n* (%)	18 (17.65)	59 (45.04)	$\chi^2_{(1, 233)} = 19.45$***
Self-compassion meditation, *n* (%)	17 (16.67)	53 (40.46)	$\chi^2_{(1, 233)} = 15.44$***
Body-focused meditation, *n* (%)	56 (54.90)	95 (72.52)	$\chi^2_{(1, 233)} = 7.80$**
Meditation years[a], *M* (*SD*)	3.43 (5.57)	7.68 (8.49)	$t_{(230)} = -4.37$***, $d = -0.58$
Meditation frequency, *n* (%)			$\chi^2_{(5, 233)} = 156.51$***
Daily	7 (6.86)	46 (35.11)	
Several times a week	15 (14.71)	85 (64.89)	
Weekly	54 (52.94)	-	
Monthly	16 (15.69)	-	
Every few months	7 (6.86)	-	
Not at all anymore	3 (2.94)	-	
Session in min, *M* (*SD*)	21.17 (11.70)	26.22 (18.39)	$t_{(231)} = -2.42$*, $d = -0.32$
Diet, *n* (%)			$\chi^2_{(4, 232)} = 12.69$**
Vegan diet	5 (4.90)	22 (16.79)	
Vegetarian diet	35 (34.31)	55 (41.98)	
Pescatarian diet	12 (11.76)	11 (8.40)	
Omnivore diet	50 (49.02)	42 (32.06)	
Big Five			
Openness	3.87 (0.83)	4.06 (0.78)	$t_{(231)} = -1.78$, $d = -0.24$
Conscientiousness	3.84 (0.75)	3.81 (0.74)	$t_{(231)} = 0.30$, $d = 0.04$
Extraversion	3.46 (0.99)	3.46 (0.95)	$t_{(231)} = 0.02$, $d = 0.00$
Agreeableness	3.42 (0.74)	3.61 (0.74)	$t_{(231)} = -1.97$*, $d = -0.26$
Neuroticism	3.01 (0.86)	2.72 (0.88)	$t_{(231)} = 2.50$*, $d = 0.33$

Meditators were divided into two groups based on their meditation frequency and reported months that they had already practiced meditation (Thiermann et al., 2020)

[a]One individual (ID 1019) reported practicing meditation for 1200 months, which would be equivalent to 100 years of meditation practice. We set this entry to missing but treated the individual as an experienced meditator given that a practice routine for 12 or 120 months would still be experienced. The main results did not change when excluding this individual from the analyses

*$p < 0.05$

**$p < 0.01$

***$p < 0.001$

Results of Research Question 2: Associations Between Meditation Practice and Mindfulness and Psychological Well-Being as well as Pro-environmental Behaviors

We then examined how meditation practice predicted mindfulness and psychological well-being. All results are presented in Table 4 (Model 1). Meditation practice was significantly positively associated with mindfulness, which was also the only model that explained a significant amount of variance. However, meditation practice was not associated with overall well-being, health, negative emotions, or loneliness, and explained variance did not reach significance.

Regarding pro-environmental behaviors, we found that meditation practice was significantly positively associated with intention-based behavior, and with lower CO_2

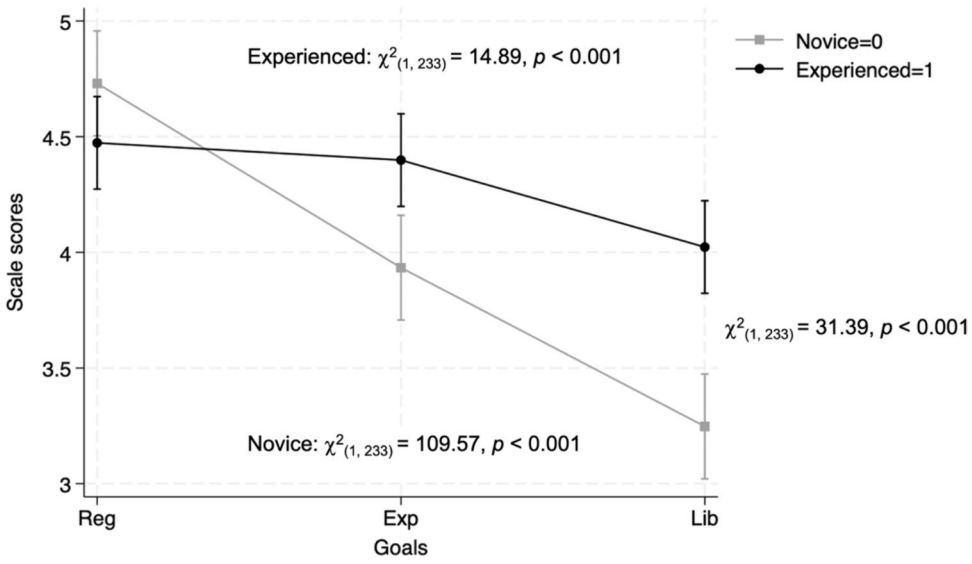

Fig. 1 Estimated marginal means and standard errors of the reported scale scores for three different goals to practice meditation. This figure demonstrates the scale scores of three meditation goals self-regulation (Reg), self-exploration (Exp), and self-liberation (Lib), reported by novice meditators (gray line) and experienced meditators (black line). Contrast-analyses revealed significant differences between all goals for novice vs. experienced meditators. The figure was created in Stata 18 (*marginsplot*) and modified in Microsoft PowerPoint

Table 3 Pairwise comparisons of estimated marginal means by goal and meditation experience

Comparison	Δ EMM (*SE*)	*Z* (Sidak)	*p* (Sidak)	95% CI (Sidak)	*d*
Between-group comparisons					
Experienced Regulation–Novice Regulation	−0.26 (0.15)	−1.67	0.778	[−0.71, 0.19]	−0.24
Experienced Exploration–Novice Exploration	0.47 (0.15)	3.02	0.038	[0.01, 0.92]	0.38
Experienced Liberation–Novice Liberation	0.78 (0.15)	5.03	< 0.001	[0.32, 1.23]	0.62
Within-group comparisons novice meditators					
Exploration–Regulation	−0.80 (0.14)	−5.62	< 0.001	[−1.21, −0.38]	−0.54
Liberation–Regulation	−1.48 (0.14)	−10.46	< 0.001	[−1.90, −1.07]	−0.95
Liberation–Exploration	−0.69 (0.14)	−4.84	< 0.001	[−1.10, −0.27]	−0.57
Within-group comparisons experienced meditators					
Exploration–Regulation	−0.07 (0.13)	−0.59	0.999	[−0.44, 0.29]	−0.05
Liberation–Regulation	−0.45 (0.13)	−3.60	0.005	[−0.82, −0.08]	−0.28
Liberation–Exploration	−0.38 (0.13)	−3.00	0.039	[−0.74, −0.01]	−0.28

Δ EMM Differences between estimated marginal means. Cohen's *d* was calculated using the observed means (based on the raw data), as the estimated marginal means were identical to the observed means up to the sixth decimal place

emissions from meat consumption. However, meditation practice did not predict any other impact-based behaviors and did not explain a significant amount of variance in these models.

To ensure that meditation practice effects were not simply due to personality differences between the two groups, we tested whether the groups differed on the Big Five (Table 2). We found significant between-group differences in neuroticism and agreeableness, with novices reporting lower scores on agreeableness, and higher scores on neuroticism than experienced meditators. Although the difference in openness had a similar small effect to that found for agreeableness, it was only marginally significant, $p = 0.076$. Past research has shown that openness is an important personality trait to predict pro-environmental behavior (Soutter et al., 2020), which is why we also added this variable to the models.

Next, we tested whether the effects of meditation practice on meditation-related outcomes remained significant after controlling for personality traits (neuroticism, agreeableness, openness), compassion meditation, and age. The effects of meditation practice remained significant (see Table 4, Model 2, and Table 5, Model 2), suggesting that the associations between meditation practice and mindfulness, intention-based pro-environmental behavior, and meat consumption were not attributable to individual differences in personality, compassion meditation, or age. All models predicting mindfulness and psychological well-being explained a significant amount of variance when including the control variables. Regarding pro-environmental behaviors, only the model predicting intention-based pro-environmental behavior explained a significant amount of variance.

Table 4 Standardized beta coefficients of meditation practice (Model 1), controlled for personality, compassion meditation, and age (Model 2) predicting mindfulness and psychological well-being

Model	Predictor	Mindfulness		Overall WB		Health		Negative emotions		Loneliness	
		β	95% CI	*β*	95% CI	*β*	95% CI	*β*	95% CI	*β*	95% CI
1	Practice	**0.30*** **	**[0.18, 0.42]**	0.10	[−0.02, 0.23]	0.12	[−0.01, 0.24]	−0.08	[−0.21, 0.05]	−0.11	[−0.23, 0.02]
R^2		**0.09***	**[0.02, 0.16]**	0.01	[−0.02, 0.04]	0.01	[−0.02, 0.04]	0.01	[−0.02, 0.03]	0.01	[−0.02, 0.04]
2	Practice	**0.15****	**[0.04, 0.26]**	0.03	[−0.09, −0.16]	0.05	[−0.07, 0.18]	−0.03	[−0.15, 0.09]	−0.05	[−0.19, 0.08]
	BFI−A	−0.00	[−0.12, 0.11]	0.09	[−0.04, 0.22]	−0.01	[−0.15, 0.12]	**−0.13***	**[−0.25, −0.02]**	−0.09	[−0.22, 0.04]
	BFI-N	**−0.54*** **	**[−0.63, −0.46]**	**−0.42*** **	**[−0.54, −0.30]**	**−0.50*** **	**[−0.60, −0.39]**	**0.55*** **	**[0.45, 0.64]**	**0.17***	**[0.03, 0.31]**
	BFI-O	**0.11***	**[0.00, 0.22]**	**0.17****	**[0.06, 0.28]**	0.01	[−0.09, 0.12]	0.07	[−0.03, 0.18]	−0.10	[−0.24, 0.03]
	C-Practice	0.01	[−0.10, 0.11]	−0.05	[−0.17, 0.07]	−0.08	[−0.21, 0.04]	0.03	[−0.09, 0.15]	0.03	[−0.10, 0.16]
	Age	**0.12***	**[0.01, 0.23]**	−0.03	[−0.15, 0.08]	0.01	[−0.11, 0.13]	**0.12***	**[0.01, 0.23]**	−0.02	[−0.16, 0.11]
R^2		**0.43*** **	**[0.33, 0.54]**	**0.27*** **	**[0.16, 0.37]**	**0.24*** **	**[0.14, 0.34]**	**0.35*** **	**[0.26, 0.45]**	**0.07***	**[0.00, 0.15]**
ΔR^2		**0.34*** **	**[0.24, 0.44]**	**0.25*** **	**[0.15, 0.36]**	**0.23*** **	**[0.13, 0.32]**	**0.35*** **	**[0.26, 0.44]**	0.06	[−0.00, 0.13]

Significant associations are presented in bold. *Overall WB* overall well-being, *BFI-A* agreeableness, *BFI-N* neuroticism, *BFI-O* openness, *C-Practice* compassion meditation practice

*$p < 0.05$

**$p < 0.01$

***$p < 0.001$

Table 5 Standardized beta coefficients of meditation practice (Model 1), controlled for personality, compassion meditation, and age (Model 2) on pro-environmental behaviors

M	Predictor	Intention-based		CO_2 Plane		CO_2 Heating		CO_2 Electricity		CO_2 Car		CO_2 Meat	
		β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI
1	Practice	**0.24*** **	**[0.12, 0.36]**	0.08	[−0.04, 0.20]	0.02	[−0.12, 0.17]	−0.03	[−0.16, 0.09]	0.10	[−0.02, 0.21]	**−0.16***	**[−0.29, −0.03]**
R^2		0.06	[−0.00, 0.11]	0.01	[−0.01, 0.03]	0.00	[−0.02, 0.02]	0.00	[−0.01, 0.02]	0.01	[−0.01, 0.03]	0.03	[−0.02, 0.07]
2	Practice	**0.16***	**[0.03, 0.29]**	0.11	[−0.02, 0.25]	−0.01	[−0.16, 0.15]	0.01	[−0.13, 0.14]	0.03	[−0.10, 0.16]	**−0.17***	**[−0.31, −0.04]**
	BFI-A	0.11	[−0.03, 0.26]	−0.02	[−0.17, 0.13]	−0.10	[−0.24, 0.04]	0.01	[−0.16, 0.19]	0.03	[−0.09, 0.14]	−0.10	[−0.23, 0.03]
	BFI-N	0.06	[−0.09, 0.21]	−0.11	[−0.27, 0.05]	−0.03	[−0.24, 0.19]	0.06	[−0.12, 0.24]	−0.05	[−0.20, 0.10]	−0.03	[−0.16, 0.11]
	BFI-O	**0.19****	**[0.06, 0.31]**	−0.01	[−0.15, 0.12]	−0.03	[−0.16, 0.11]	−0.04	[−0.17, 0.09]	−0.07	[−0.21, 0.06]	**−0.13***	**[−0.26, −0.01]**
	C-Practice	0.04	[−0.10, 0.18]	−0.06	[−0.20, 0.08]	0.05	[−0.10, 0.20]	−0.07	[−0.20, 0.06]	0.08	[−0.06, 0.23]	−0.03	[−0.16, 0.11]
	Age	0.11	[−0.02, 0.24]	−0.09	[−0.21, 0.03]	0.08	[−0.03, 0.19]	−0.02	[−0.15, 0.10]	0.11	[−0.04, 0.26]	0.13	[−0.01, 0.26]
R^2		**0.11***	**[0.03, 0.20]**	0.02	[−0.02, 0.07]	0.02	[−0.06, 0.09]	0.01	[−0.03, 0.06]	0.04	[−0.01, 0.09]	0.07	[−0.00, 0.14]
ΔR^2		0.06	[−0.01, 0.12]	0.02	[−0.03, 0.06]	0.02	[−0.05, 0.09]	0.01	[−0.03, 0.06]	0.03	[−0.02, 0.08]	0.04	[−0.01, 0.10]

Significant associations are presented in bold. *BFI-A* agreeableness, *BFI-N* neuroticism, *BFI-O* openness, *C-Practice* compassion meditation practice

*$p<0.05$

**$p<0.01$

***$p<0.001$

Results of Research Question 3: Incremental Predictive Value of Meditation Goals

Next, we included all meditation goals in the models described above. Figure 2a shows the standardized coefficients and 95% CIs for meditation practice and the three meditation goals, while controlling for neuroticism, agreeableness, openness, compassion meditation, and age (Model 3). The effects of meditation practice remained unchanged. Self-regulation was significantly negatively associated with mindfulness, whereas self-exploration was positively associated with it. The coefficients for these two goals significantly differed from each other, $b_{Diff}=0.26$, $SE=0.09$, 95% CI [0.09, 0.44], $p=0.003$. Additionally, self-regulation was significantly negatively associated with overall well-being and positively associated with negative emotions. The negative effect of self-regulation on overall well-being significantly differed from the positive coefficient found for self-liberation, $b_{Diff}=0.18$, $SE=0.09$, 95% CI [0.01, 0.35], $p=0.041$. However, neither self-exploration nor self-liberation was associated with these outcomes. Furthermore, adding the three meditation goals to the models predicting mindfulness and psychological well-being did not significantly increase the amount of explained variance (Fig. 2a). When controlling for outliers, the negative effect of self-regulation on overall well-being was still small but was no longer significant, $\beta=-0.11$, $p=0.055$, and openness was no longer associated with greater mindfulness (Online Resource, Table S2). All other effects remained unchanged.

Regarding pro-environmental behaviors, the goal of self-liberation was significantly associated with more intention-based behavior (Fig. 2b). In contrast, self-exploration was negatively associated with it, and the coefficient for this association was significantly different from the one found for self-liberation and for self-regulation ($b_{Diff}=-0.37$, $SE=0.13$, 95% CI [−0.12, −0.61], $p=0.004$, and $b_{Diff}=-0.24$, $SE=0.11$, 95% CI [−0.46, −0.03], $p=0.026$, respectively). Furthermore, self-liberation was significantly associated with a smaller CO_2 footprint from meat consumption, whereas self-exploration was significantly associated with a larger footprint. The two were significantly different from each other, $b_{Diff}=-0.50$, $SE=0.13$, 95% CI [−0.75, −0.24], $p<0.001$. Finally, self-regulation was significantly and positively associated with higher CO_2 emissions from car use and heating. These associations differed significantly from the negative coefficients found for self-liberation (car: $b_{Diff}=-0.24$, $SE=0.09$, 95% CI [−0.41, −0.06], $p=0.008$; heating: $b_{Diff}=-0.18$, $SE=0.09$, 95% CI [−0.35, −0.01], $p=0.04$). While the inclusion of meditation goals did not significantly increase the models' explanatory power, the models predicting intention-based behavior and CO_2 emissions from meat consumption and car use were significant overall, explaining approximately 15%, 13%, and 7% of the variance, respectively (Fig. 2b).

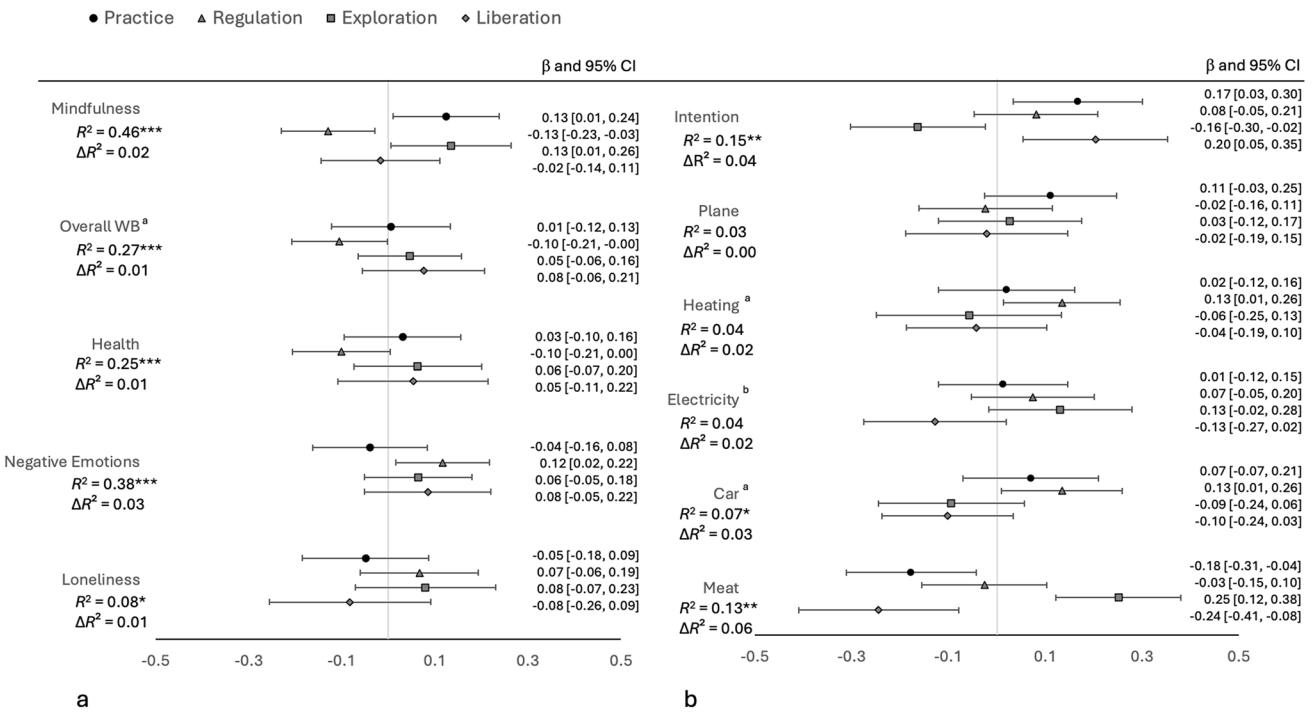

Fig. 2 Standardized β-coefficients and 95% CIs of meditation practice and meditation goals (self-regulation, self-exploration, self-liberation) predicting (**a**) mindfulness and psychological well-being and (**b**) pro-environmental behaviors. Results are based on Model 3 and Control for Neuroticism, Agreeableness, Openness, Compassion Meditation, and Age. ΔR^2 represents the increase of explained variance from Model 2 (without meditation goals) to Model 3 (including meditation goals). Intention = Intention-based pro-environmental behavior. [a] = Effect of self-regulation became non-significant when controlling for outliers. [b] = Effect of self-exploration became significant when controlling for outliers. The figure was created in Microsoft Excel and modified in Microsoft PowerPoint. $^*p < 0.05$. $^{**}p < 0.01$. $^{***}p < 0.001$

Controlling for outliers rendered the positive coefficients of self-regulation on CO_2 emissions from heating, $\beta = 0.06$, $p = 0.441$, and car use, $\beta = 0.03$, $p = 0.652$, insignificant. Meanwhile, the positive effects of self-exploration on electricity consumption, $\beta = 0.16$, $p = 0.020$, and of age on CO_2 emissions from car use, $\beta = 0.25$, $p < 0.001$, and meat consumption, $\beta = 0.17$, $p = 0.007$, were significant (Online Resource, Table S3). All other effects remained unchanged.

In summary, pursuing the goal of self-liberation was associated with more intention-based behavior and fewer CO_2 emissions from meat consumption, whereas pursuing the goal of self-exploration was associated with fewer intention-based behaviors and higher CO_2 emissions from meat consumption.

Discussion

Evidence varies as to whether meditation practice can increase both individuals' psychological well-being and pro-environmental behavior. Highlighting this connection is crucial, as it underscores the potential of meditation practices to contribute to global sustainability efforts by fostering behaviors that align with environmental conservation (e.g., Ericson et al., 2014). The previous heterogeneous results may be explained by three meditation goals (Shapiro, 1992): self-regulation, self-exploration, and self-liberation, which are thought to evolve over time and with continued meditation practice.

In our study, we aimed to investigate whether patterns of these meditation goals differ between novice and experienced meditators, and whether such goals could predict outcomes like mindfulness, psychological well-being, and pro-environmental behaviors. First, our findings showed that experienced meditators more strongly endorsed self-liberation goals than novices. While they also pursued self-regulation and self-exploration, they placed nearly equal emphasis on self-liberation. Furthermore, all three goals were positively correlated, suggesting that experienced meditators may aim to benefit both themselves and others through their practice. These findings align with Pepping et al. (2016), who observed similar trends in self-regulation goals among meditators of all levels, and with Sedlmeier and Theumer (2020), who identified both self-exploration and self-liberation as common goals among experienced meditators.

With continued practice, meditation goals may become more spiritual, and awareness of one's own needs may gradually expand to include the needs of others through a growing sense of connectedness (see also Schmidt, 2014; Shapiro, 1992). Supporting this notion, Jiwani et al. (2022) found that experienced meditators described broader motivations than at the beginning of their practice, with spiritual goals being particularly linked to sustained practice. However, other studies found that spiritual goals were rated as more important by individuals with a spiritual background (Pepping et al., 2016; Sedlmeier & Theumer, 2020).

In line with contemplative frameworks (Schmidt, 2014; Shapiro, 1992), initial self-regulatory intentions may thus evolve into broader aims such as connectedness and compassion. While our cross-sectional design precludes causal conclusions, the observed differences between novice and experienced meditators may reflect such a developmental trajectory. This idea is further supported by a recent prospective longitudinal study. Bowles and Van Dam (2025) found that meditators who engaged in more meditation practice over a 2- to 4-year period reported placing greater importance on spiritual growth as a meditation goal at the follow-up.

After establishing these goal patterns, we examined whether meditation practice was associated solely with mindfulness and psychological well-being or also with pro-environmental behaviors. Although experienced meditators reported higher mindfulness, they did not report greater well-being than novices. This somewhat unexpected finding may reflect the complex dose–response relationship between meditation and well-being: Bowles et al. (2022) found that lifetime meditation hours were nonlinearly associated with mental health outcomes, suggesting that the effect may plateau after approximately 500 h of practice.

However, we found experienced meditators to engage more in intention-based pro-environmental behaviors and to produce fewer emissions from meat consumption, aligning with Thiermann et al. (2020). While evidence suggests that personality traits (e.g., Soutter et al., 2020) and compassion meditation (Thiermann et al., 2020) may contribute to pro-environmental behavior, in our sample, differences in these variables did not explain pro-environmental behavior beyond meditation experience. The only exception was openness, which was also associated with more intention-based pro-environmental behavior and reduced meat consumption. This finding is consistent with previous research (Soutter et al., 2020). This supports the notion that experienced meditators may be more likely to care for others, including animals, independent from personality differences, meditation technique, and age.

We next explored whether meditation goals themselves, in addition to meditation practice, could better predict mindfulness, psychological well-being, and pro-environmental behaviors. Our results suggested that goals did add explanatory value. In particular, self-regulation was the only goal negatively associated with mindfulness and well-being while positively correlated with negative emotions. This pattern may indicate that individuals experiencing lower well-being were more likely to pursue meditation as a means to manage emotional difficulties. This interpretation is supported by findings from Cramer et al. (2016), who found that individuals who used meditation were more likely to deal with one or more diagnosed chronic illnesses compared to non-users. Moreover, they found that mental health problems were the most common reason for people to start meditating. An alternative explanation, however, is that some individuals may engage in meditation with the goal of self-regulation but do not experience the desired benefits or may even feel worse afterwards: Buric et al. (2022) found that individuals with higher levels of psychopathology may respond negatively to meditation interventions. This could also help explain the observed negative association between this goal and well-being.

It is also noteworthy that we found no associations between self-exploration or self-liberation and psychological well-being. These goals may represent long-term or existential aspirations, the benefits of which may not yet be evident in subjective well-being, particularly in cross-sectional designs. Indeed, self-exploration can initially be unsettling or emotionally demanding when a non-judgmental, accepting attitude has not yet been established (e.g., Lindsay & Creswell, 2017), which could explain why this goal was associated with mindfulness, but not with well-being. Similarly, self-liberation may involve disengaging from conventional goals or identity structures typically associated with well-being (e.g., Dambrun & Ricard, 2011). Future research could examine whether these goals have delayed or nonlinear effects on well-being depending on where individuals are in their meditative journey.

Regarding pro-environmental behaviors, only the goal of self-liberation was positively associated with intention-based pro-environmental behaviors and negatively with CO_2 emissions from meat consumption. This supports the two-pathway model of pro-environmental behavior (Thiermann & Sheate, 2020), which suggests that connectedness fosters empathy and compassion for nature, potentially internalizing a motivation to act in environmentally friendly ways. One explanation for only a few associations between self-liberation and pro-environmental behaviors may be that most behaviors were less controllable. Creating conditions that make sustainable choices accessible—like improved rural infrastructure or affordable organic foods—could enable people to act in line with their environmental intentions, as such behaviors may depend more on situational circumstances (Geiger et al., 2018). Practitioners of meditation, particularly those emphasizing self-liberation, could play

a vital role in advocating for or supporting these structural changes, thereby translating their internal values into broader societal impact.

There may also be other reasons why other impact-based behaviors, such as travelling by plane and car, or home heating, were not related to self-liberation. Abstaining from meat consumption—which directly avoids harming and killing animals—may be a more immediate outcome of feeling connected with all living things. In contrast, the environmental consequences of travelling by car or plane may feel too abstract or distant to individuals. However, with experience, the awareness of these interconnections may become clearer. This idea resonates with the ethical principles of some branches of Buddhism, such as Mahāyāna Buddhism, which is often referred to in discussions about the role of Buddhism in climate activism (e.g., Cairns & Pihkala, 2024).

Another factor could be that some individuals believed they could offset non-ecological behaviors by adopting specific pro-environmental actions, such as not eating meat (Hope et al., 2018; Sörqvist & Langeborg, 2019). Finally, a cost–benefit analysis might play a role: An experiment by Wyss et al. (2022) showed that pro-environmental behavior is more likely when costs are low and environmental benefits are high. Therefore, for meditators to engage in consistent pro-environmental behaviors, it may be essential for them to understand the interconnectedness of all actions and how even small choices can have a significant environmental impact.

Interestingly, pursuing the goal of self-exploration was associated with more, rather than less, CO_2 emissions from meat consumption, possibly due to a stronger focus on personal needs over others' well-being. This resonates with findings that brief meditations in laboratory settings can lead to more or less prosocial behavior depending on whether individuals see themselves as interdependent with or independent from others (Poulin et al., 2021). Thus, our results align with the notion that meditation's effectiveness in promoting pro-environmental behavior may depend on the practitioner's underlying intention (Schindler & Friese, 2022; Schmidt, 2014).

Furthermore, an individual's meditation goals are likely influenced by a variety of personal and environmental factors. While individuals with higher levels of depression, anxiety, and stress might initially focus on alleviating these states through meditation (e.g., Cramer et al., 2016), research suggests that an exclusive focus on hedonic well-being (i.e., personal happiness) might not be as successful in reaching these goals as pursuing goals that emphasize broader life purpose and interpersonal connections, known as eudaimonic well-being (Sheldon & Lyubomirsky, 2021).

To maximize the benefits of meditation, it may therefore be essential to clarify one's intentions beforehand and adapt the practice accordingly. Practicing compassion meditation, for example, may not yield significant benefits if the practitioner does not intend to cultivate compassion. However, targeted compassion training could also strengthen a person's sense of connectedness and foster prosocial motivations, potentially aligning their goals over time. Indeed, studies have shown that even a brief loving-kindness meditation can increase feelings of connectedness and positivity towards others (Hutcherson et al., 2008). Additionally, a 9-month intervention showed the greatest increase in feelings and warmth and positive thoughts about others when individuals practiced loving-kindness meditation (Kok & Singer, 2017). Further longitudinal intervention studies would be valuable for exploring these interactions. Encouraging meditation goals focused on enhancing interpersonal connectedness, which could potentially broaden one's meaning in life and the scope of meditation's benefits, may help practitioners to use their growth not only for self-improvement but also for contributing positively to the lives of others. Such interventions might be particularly effective in settings like schools (Phan et al., 2022) or workplace (Bonde et al., 2024).

Limitations and Future Research

Despite these insights, some limitations need to be considered. Given that our study was cross-sectional, we cannot make causal inferences. It is possible that our sample of experienced meditators was self-selected, with those more motivated by self-liberation persisting in their practice (e.g., Jiwani et al., 2022), while others who focused more on self-exploration and self-regulation may have stopped practicing. Only a longitudinal study could rule out this possibility, ideally by tracking novices over several years to observe changes in their goals and outcomes.

Furthermore, although we observed consistent associations between self-regulation and psychological well-being, which may indicate a more robust and generalizable effect, the effects of self-exploration and self-liberation on pro-environmental behaviors such as CO_2 emissions from transport or electricity use were largely absent or weak. One exception was the opposite effect of self-exploration and self-liberation on intention-based behavior and CO_2 emissions from meat consumption. The selective nature of our results may reflect the fact that the impact of meditation goals depends on the specific outcome considered and is context-sensitive.

It is also possible that the measurement of certain behavioral outcomes lacked sufficient precision or sensitivity to detect existing effects. Although we included both intention-based and impact-based behaviors, our estimates of CO_2 emissions relied on self-reports and general statistics, making them rough approximations rather than precise measurements. A more accurate measure of pro-environmental

behavior may be the Work for Environmental Protection Task (WEPT; Lange & Dewitte, 2022). Future research should aim to replicate these findings using alternative operationalizations and broader outcome sets, including behavioral tasks such as the WEPT, to further examine the role of meditation goals in shaping both psychological well-being and pro-environmental behavior.

In conclusion, we found that meditation goals related to self (self-regulation and self-exploration) were pursued more by novice meditators, while experienced meditators showed a more balanced interest in goals related to both self and others. Further, while the goal of self-regulation was negatively associated with well-being, self-liberation was positively correlated with some pro-environmental behaviors. Given the significance of meditation goals, future longitudinal studies should investigate how these goals evolve and impact both individual psychological well-being and pro-environmental behavior over time.

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Data Availability All data and measures can be accessed publicly on OSF (https://osf.io/mx36p/overview).

Declarations

Ethics Approval This study has been approved by the local ethics committee (Institute of Psychology, Johannes Gutenberg University Mainz; 2021-JGU-psychEK-S005) and has been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

Informed Consent All participants provided informed consent prior to taking part in the online survey.

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