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Do Environmental Messages Emphasising Binding Morals Promote Conservatives' Pro-Environmentalism? A Pre-Registered Replication

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Supplementary Materials: Data, Materials, Preregistration [see Index of Supplementary Materials]

Abstract

Past studies indicated that environmental messages incorporating binding morals (i.e., loyalty/betrayal, authority/subversion, purity/degradation) were effective in reducing the negative association between political conservatism and pro-environmentalism. We conceptually replicated and extended this finding through open science practices. In a pilot study, we constructed three environmental messages incorporating each binding moral based on previous relevant studies, and confirmed their validity (96 U.S. adults, 50% women). We then investigated the independent effects of these binding moral messages on pro-environmentalism across the political spectrum (705 U.S. adults, 56.6% women). Contrasting with our expectations and previous findings, we found no evidence that these environmental messages emphasising distinct binding morals were more effective than a control environmental message in attenuating the political polarisation on conservation intentions and willingness to receive more information about environmental protection. Simply adding binding morals content in environmental messaging may not be useful in promoting conservatives' pro-environmental engagement. We further discuss future research as well as the limitations of this research.

Keywords

environmental messaging, binding morals, political polarisation, pro-environmentalism

Highlights

- Research suggests that environmental messages that contain binding morals (e.g., "ingroup loyalty") are relatively more convincing to more conservative people.
- We tested the extent to which three environmental messages focusing on each binding moral promoted pro-environmental interest and intentions among more conservative people, relative to a control environmental message.
- Our high-powered pre-registered study showed that the binding moral messages failed to attenuate the political polarisation on the pro-environmental outcomes, and thus did not corroborate the findings of prior research.
- Framing environmental messages with the wording from binding morals may not be sufficient to induce more conservative people's pro-environmental behaviours.

Around 97% of climate scientists endorse the existence of anthropogenic climate change and its severe negative impacts on the natural environment (Cook et al., 2016; Intergovernmental Panel on Climate Change, 2021). However, many people do not believe the reality of anthropogenic climate change or are unwilling to take pro-environmental actions (Jacques et al., 2008; Leiserowitz et al., 2021; Milfont et al., 2015). Noticeably, political orientation, mostly described along a liberal–conservative dimension, is an important predictor in explaining the resistance to pro-environmentalism, despite cross-national differences in political contexts (Hornsey et al., 2016, 2018). That is, more conservative people tend to not only resist progressive changes and accept inequality (Jost et al., 2003), but also distrust the reality of anthropogenic climate change and oppose climate mitigation policies and practices (Ballew et al., 2019; Jylhä et al., 2016; Pew Research Center, 2019; Rutjens & van der Lee, 2020). Furthermore, extensive communication on the realities of climate change and pollution in the media has not reduced the political polarisation on pro-environmentalism (Ballew et al., 2019). Because anthropogenic climate change and environmental problems are urgent and critical matters for human survival (Hoegh-Guldberg et al., 2018), it is necessary to understand and overcome the unwillingness of more conservative people to take pro-environmental actions.

The extant literature has documented several methods to bridge the political polarisation on pro-environmentalism. One method is to inform conservatives of scientific consensus on environmental issues to persuade them to believe the seriousness of environmental problems and the urgency of taking pro-environmental actions (Goldberg et al., 2019; van der Linden et al., 2017). Another method is to appeal to conservatives through the messaging of their conservative peers who agree with the need for pro-environmental engagement (Goldberg et al., 2021; Hurst & Stern, 2020). This method matching the source of messaging with conservatives' political identity might be effective because people are more easily persuaded by their ingroup members than outgroup members

(Fielding & Hornsey, 2016), but it was not empirically supported by Baldwin and Lammers (2016, Study 1) and Kim et al. (2021). A final method is to frame environmental messages with conservative worldviews, particularly manipulating temporal comparison and morals. Baldwin and Lammers (2016) found that past-focused messaging was more effective than future-focused messaging in promoting conservatives' pro-environmentalism, although other researchers recently failed to replicate some of their findings (Kim et al., 2021; Stanley et al., 2021). Also, a growing number of studies found that environmental messages emphasising *binding* morals—*loyalty/betrayal*, *authority/subversion*, and *purity/degradation* morals—were more effective in reducing the political polarisation on pro-environmentalism than environmental messages emphasising *individualising* morals —*care/harm* and *fairness/cheating* morals (Feinberg & Willer, 2013; Hurst & Stern, 2020; Wolsko et al., 2016). In the present research, we aimed to investigate whether the moral framing of environmental messages is one means of alleviating the political polarisation on pro-environmentalism.

Moral Foundations and Pro-Environmentalism

Moral Foundations Theory originally identified five distinct foundations for people's morals: Care/harm, fairness/cheating, loyalty/betrayal, authority/subversion, and purity/degradation morals (Graham et al., 2009; Haidt & Graham, 2007). According to Graham et al. (2009), care/harm and fairness/cheating moral foundations are known as individualising morals because these two morals involve protecting individuals' rights and welfare. By contrast, loyalty/betrayal, authority/subversion, and purity/degradation moral foundations are known as binding morals because these morals involve "group-binding loyalty, duty, and self-control" (Graham et al., 2009, p. 1031). Although *liberty/oppression* moral was added later as another moral foundation (Haidt, 2012; Iyer et al., 2012), most environmental research using Moral Foundations Theory has been conducted on the original five moral foundations (e.g., Baldner, 2018; Dickinson et al., 2016; Hurst & Stern, 2020; Milfont et al., 2019; Wolsko et al., 2016).

Notably, research indicates that liberals and conservatives make moral judgements based on different sets of moral foundations (Graham et al., 2009; Jost et al., 2009; Strupp-Levitsky et al., 2020). Whereas more liberal people tend to rely on individualising morals which value individuals' rights and justices with empathetic motivation, more conservative people tend to rely on binding morals which value ingroup loyalty, purity, order, and conventions intending to minimise uncertainty (Graham et al., 2009; Jost et al., 2009; Strupp-Levitsky et al., 2020). Linking these observations to environmentalism, more liberal people tend to endorse pro-environmentalism because they tend to be more empathetic toward nature and think that it is fair to protect the natural environment for other people and future generations; by contrast, more conservative people tend to disagree with pro-environmentalism because they are reluctant to make behaviour changes to protect the natural environment and instead prefer to follow tradition (Baldner, 2018;

Dickinson et al., 2016; Feinberg & Willer, 2013). This has been confirmed by studies showing that individualising morals were strongly and positively predictive of pro-environmentalism, but binding morals were either not statistically significantly or negatively associated with pro-environmentalism such as climate change belief, pro-environmental attitudes, electricity conservation, and Green Party support (Baldner, 2018; Dickinson et al., 2016; Milfont et al., 2019; Rossen et al., 2015). Hence, Moral Foundations Theory can provide insights about the political polarisation on pro-environmentalism.

Moral Reframing in Environmental Messaging

The discrepancy in relying on moral foundations between liberals and conservatives also explains why common pro-environmental messages are not effective in appealing to conservatives. Feinberg and Willer (2013, Study 2) analysed pro-environmental messages in selected videos and newspapers, and found that pro-environmental messages mostly emphasise only care/harm morals, which is an individualising moral. Although liberals are willing to endorse this care/harm-focused pro-environmental messaging, this messaging is not effective in persuading conservatives to change their opinions and behaviours due to the mismatch between the moral messaging and their moral foundations (e.g., Feinberg & Willer, 2013, Study 3; Wolsko et al., 2016). More conservative people tend to rely on binding morals when making moral judgements (Graham et al., 2009), so messages only incorporating individualising morals are not persuasive to more conservative people. For this reason, in this study we focused on binding morals which resonate with conservative philosophy and virtues.

Experimental research found that *moral reframing* as a communication strategy can be effective in enhancing more conservatives' pro-environmentalism. Moral reframing refers to changing rhetoric to align with valued moral foundations in the audience (Feinberg & Willer, 2013, 2015, 2019; Voelkel & Feinberg, 2018) and is commonly employed to change people's attitudes on politically polarised issues (e.g., Bloemraad et al., 2016; Druckman & McGrath, 2019). For example, Feinberg and Willer (2013, Study 3) framed an environmental message to focus on purity/degradation morals (e.g., "Preserving that purity is important. We should regard the pollution of the places we live in to be disgusting"). The authors found that the purity/degradation-focused environmental message was more effective than a harm/care-focused environmental message (e.g., "Protect our natural habitats and start caring about the environment") in promoting more conservative people's pro-environmental attitudes, support for pro-environmental legislation, and belief in global warming. Recently, the Feinberg and Willer (2013) finding that the purity/degradation moral-focused message reduced the political polarisation on pro-environmental attitudes was replicated among a Turkish sample (Çavdar, 2021). Moreover, Kidwell et al. (2013) framed a moral environmental message to emphasise all three binding morals (e.g., "Your actions can help us do our civic duty because recycling is the responsible thing in our society. Because of people like you, we can follow the

advice of important leaders by recycling"). This message increased more conservative people's recycling intentions than an environmental message emphasising individualising morals (e.g., "Your actions can help care for others and allow the greatest good for society").

More recently, other research has conceptually replicated these initial studies manipulating moral foundations in environmental messaging. Wolsko et al. (2016) extended the findings of Kidwell et al. (2013) to the general environmental domain and confirmed that an environmental message incorporating binding morals (e.g., "Take pride in the American tradition of performing one's civic duty by taking responsibility for yourself and the land you call home") can reduce the political divides on conservation intentions, climate change attitudes and donations for environmental protection, when compared to an environmental message incorporating individualising morals (e.g., "Help to reduce the harm done to the environment by taking action"). In another study, Hurst and Stern (2020) framed an environmental message to emphasise all original five moral foundations plus a new addition to Moral Foundations Theory, economic liberty (e.g., "We still depend heavily on foreign imports from countries linked to extremist terrorism. Dependence on these corrupt regimes threatens our values and puts our national security at risk"). This messaging enhanced conservatives' support for moving away from fossil fuels compared to an environmental message emphasising only individualising morals (e.g., "Fossil fuel emissions from oil and coal pollute our air and water, exposing all living things to harmful toxins and disrupting the balance of nature"). However, Hurst and Stern (2020) found little evidence of the positive moral reframing effects on other domains such as behaviour intentions and interest in learning more about transitioning away from fossil fuels.

These previous experimental studies showed that binding morals can be useful in designing effective pro-environmental messages, but most research has examined these morals in combination in environmental messaging. Specifically, most research compared environmental messaging incorporating all binding morals with environmental messaging incorporating all individualising morals in inducing pro-environmentalism (e.g., Kidwell et al., 2013; Wolsko et al., 2016). Although Feinberg and Willer (2013, Study 3) and Çavdar (2021) contrasted the effects of a purity/degradation-focused environmental message and a care/harm-focused environmental message on pro-environmentalism, to our knowledge, no other experimental research has focused on a particular binding moral in environmental messaging. Thus, previous studies lack detail on independent effects of the environmental messages that use binding morals when compared to a control environmental message without any moral reframing. There is a need to confirm whether environmental messages framed with each binding moral are effective and whether there are any differences in the effects of these moral-focused environmental messages on pro-environmentalism because the results can provide insights in designing effective and economical messages for a broad audience.

Present Research

We aimed to investigate the independent effects of environmental messages emphasising each binding moral on both conservation intentions and willingness to receive more information about environmental protection, relative to a control environmental message, and explore the differences between the moral-focused messages. We report two pre-registered studies. In a pilot study, we constructed three environmental messages focusing on distinct binding morals (i.e., loyalty/betrayal, authority/subversion, purity/degradation; see Supplementary Materials Table S1) drawing from the Moral Foundations Questionnaire (Graham et al., 2011) and previous moral-focused environmental messages used in relevant studies (Feinberg & Willer, 2013; Hurst & Stern, 2020; Kidwell et al., 2013; Wolsko, 2017; Wolsko et al., 2016), and tested the validity of these environmental messages. In the main study, we investigated the extent to which the negative links between participants' political conservatism and both conservation intentions and willingness to receive more information about environmental protection would be attenuated by exposure to the binding moral messages relative to the control group. Finally, we aimed to conduct exploratory tests of the relative effects of the binding moral messages on pro-environmentalism over the political spectrum. This research was approved by the Victoria University of Wellington Human Ethics Committee (#29081). We pre-registered our research plan prior to data collection and made all the de-identified data sets, analytical script, and R outputs available in the Open Science Framework (see Supplementary Materials).

Pilot Study

In the pilot study, we aimed to test the validity of the three independent environmental messages we constructed (i.e., loyalty/betrayal, authority/subversion, purity/degradation-focused environmental messages; see Supplementary Materials Table S1). We hypothesised that the majority of the participants who read each message would choose the corresponding moral foundation description. For example, participants who read the loyalty/betrayal-focused environmental message would choose the loyalty/betrayal description.

Method

Participants

The *pwr* package (Version 1.3-0; Champely, 2020) in R estimated that the required number of participants in chi-squared tests for goodness of fit was at least 57 participants to obtain 90% power to detect a large effect ($w = 0.50$, $p = .05$, $df = 3$[1]; see https://osf.io/awpz8 for the R code and https://osf.io/dnbtz for the result). To account for potential exclusion, we targeted 100 U.S. adults for the pilot study. We recruited

participants from the Amazon Mechanical Turk (MTurk) participant pool through CloudResearch. Those who did not meet the demographic criteria (age, nationality, and location), the minimum task completion number (100), or the minimum approval task rate (95%) were unable to participate in this study. Also, we prevented those who failed Qualtrics' Captcha Verification, CloudResearch's attention and engagement measures, or those who had completed any of our prior research on the topic (see Kim et al., 2021) from participating in this study. Moreover, we restricted repeated participation from the same IP address and blocked access from both duplicate and suspicious locations.

Final Sample — A total of 99 U.S. adults residing in the U.S. completed our online survey receiving $0.50 USD as monetary compensation in February 2021. We discarded three cases because the participants indicated that there was a reason to delete their data. Thus, the final sample consisted of 96 U.S. adults (48 men, 48 women), aged between 19 and 79 years old (M = 40.14, SD = 13.50). Their ethnicities were: 73.96% Caucasian, 4.17% African American, 4.17% Hispanic, 13.54% Asian, 1.04% Pacific islander, and 3.13% Multiracial American. The majority of the participants were liberals (63.54%, M = 3.23, SD = 1.80), with the remaining conservatives (21.88%) and moderates (14.58%). See additional demographic information in the Supplementary Materials.

Materials and Procedure

Environmental Messages — We constructed three pro-environmental messages for each of the three binding morals. Each environmental message emphasised either loyalty/betrayal (e.g., "protect the natural environment as a sign of loyalty to our country"), authority/subversion (e.g., "protect the natural environment by respecting advice from authority") or purity/degradation (e.g., "protect the purity of the natural environment from pollution"). As noted, we based messages on the Moral Foundations Questionnaire (Graham et al., 2011) and prior experimental work using moral-focused environmental messages (Feinberg & Willer, 2013; Hurst & Stern, 2020; Kidwell et al., 2013; Wolsko, 2017; Wolsko et al., 2016). Messages were designed to be comparable in length, valence, and structure. We also limited all the messages to the local environment to be consistent in terms of the messaging scope (e.g., "Protecting the local environment"). All messages started with the same phrase (i.e., "It is important to protect the natural environment") and ended with two identical sentences (i.e., "Our daily behaviors have a huge impact on the environment. Simply recycling, reducing consumption, using energy efficient appliances, and driving less can make a big difference."), adapted from Feinberg and Willer (2013, Study 3). Supplementary Materials Table S1 presents the messages in full.

1) We also piloted an economic liberty/oppression-focused message for inclusion in a future study (see the preregistration in the Supplementary Materials). However, we did not conduct the additional study due to the unexpected lack of replication.

Validation Descriptions — Participants were shown each environmental message in a random order. Participants were asked to select a moral foundation description to match each message from six options (e.g., "This message was shaped by our long primate history of hierarchical social interactions. It underlies virtues of leadership and followership, including deference to legitimate authority and respect for traditions."—authority/subversion moral; see Table S1). The six options were adapted from the summary of the six moral foundations provided at https://moralfoundations.org.

Results and Discussion

We conducted all the following analyses in R (Version: 4.1.2, R Core Team, 2021) and used the *rcompanion* package (Version: 2.4.13, Mangiafico, 2022) to calculate Cohen's *w*. To be consistent with the power analyses for this research and previous relevant research (e.g., Feinberg & Willer, 2013; Hurst & Stern, 2020; Kidwell et al., 2013; Wolsko et al., 2016), we used the critical *p*-value of .050 in a two-tailed test throughout the present research. In the pilot study, we tested whether participants correctly identified the intended binding morals of the environmental messages we had constructed, with chi-square tests for goodness of fit. These tests compared frequencies of the responses to check whether participants selected the corresponding binding moral foundation that applied to each environmental message at a greater rate than chance.

The chi-square test was statistically significant in each case. Participants appropriately selected the corresponding moral foundation summary for the loyalty/betrayal-focused environmental message (65.63%; $\chi^2(5) = 168.25$, $p < .001$, Cohen's $w = 1.32$), the authority/subversion-focused message (69.79%; $\chi^2(5) = 197$, $p < .001$, Cohen's $w = 1.43$), and the purity/degradation-focused message (63.54%; $\chi^2(5) = 158.75$, $p < .001$, Cohen's $w = 1.29$), out of the six possible options. Also, there was no evidence that participants systematically misattributed the messages into one of the five other categories (classifications of all messages into other categories were each below 16.67%). These findings validated the moral-focused environmental message we constructed by indicating that the majority of participants chose the moral foundation summary that corresponded with the intended binding moral underpinning each environmental message. We then used these validated messages in a separate experiment.

Main Study

We tested the extent to which the environmental messages based on each binding moral affected participants' pro-environmentalism, and the extent to which this effect differed by their political orientation. Specifically, we tested the extent to which the three environmental messages validated in the pilot study (i.e., loyalty/betrayal, authority/subversion, purity/degradation-focused messages) affected participants' conservation inten-

tions and their willingness to receive more information about environmental protection. Critically, we hypothesised a negative association between participants' political conservatism and their pro-environmentalism, but that this association would be attenuated in the three conditions where participants read the messages based on binding morals relative to the pro-environmental message in the control condition. Thus, we expected relatively more conservative people to show greater (1) conservation intentions and (2) willingness to receive more information about protecting the environment after reading pro-environmental messages based on binding morals, compared to reading a control environmental message.

We also had pre-registered exploratory questions testing for potential differences among the environmental messages incorporating each binding moral in promoting participants' conservation intentions and willingness to receive more information. Although we did not have firm hypotheses for contrasting the three binding morals, research indicates authority/subversion and loyalty/betrayal morals are the most strongly and the most weakly endorsed by conservatives, respectively (Graham et al., 2009). Hence, we expected that the authority/subversion-focused message would be the strongest moderator between conservatism and both conservation intentions and willingness to receive more information, relative to the loyalty/betrayal-focused environmental message.

Method

Participants

We estimated required power by conducting simulation models using the *paramtest* package (Version: 0.1.0; Hughes, 2017) in R (Version: 4.1.2; R Core Team, 2021). For the power analysis, we used the parameters (R^2 = .20, $b1$ = 0.20, $b2$ = 0.20, $b3$ = 0.20, $b4$ = −0.60, $b5$ = 0.40, $b6$ = 0.30, $b7$ = 0.30; see https://osf.io/awpz8 for the R code and https://osf.io/dnbtz for the result) based on prior research (e.g., Baldwin & Lammers, 2016, Study 1; Feinberg & Willer, 2013, Study 3). The result indicated that we needed at least 800 participants to attain 90% power at the critical p-value of .050 (two-tailed test). Considering the potential exclusion of participants, we planned to recruit 900 U.S. adults for the present study, using the same method and restriction criteria as in the pilot study.

Final Sample — A total of 903 U.S. adults completed the survey in this study in February 2021. Because three participants failed to enter a correct confirmation code and missed receiving compensation, our initial sample size exceeded the planned initial sample size. In accordance with the pre-registered exclusion criteria, we excluded a total of 198 participants. Specifically, we excluded 30 participants who indicated that there is a reason to delete their data. We also excluded 109 participants who indicated that they are familiar with the study and 59 participants who did not pass a message recognition check (i.e., participants who did not correctly remember the key point of the binding moral messages they read). The final sample comprised 705 U.S. adults (300

men, 399 women, 6 others), which attained 86.8% power in the power analysis (see https://osf.io/dnbtz)[2]. Their ages ranged from 18 to 79 years old (M = 44.05, SD = 13.98). Most participants were Caucasian (78.44%), followed by African American (7.66%), Asian (5.82%), Hispanic (3.97%), Multiracial American (2.41%), others (0.85%), Native American (0.71%), and Pacific Islander (0.14%). Participants were skewed in the liberal direction: M = 3.51, SD = 1.77 (50.78% liberals, 18.72% moderates, 30.50% conservatives). See additional demographic information in the Supplementary Materials.

Material

Environmental Messages — We used the environmental messages we validated in the pilot study plus a control condition message (see Supplementary Materials Table S1). The control condition message consisted of the overlapping phrases among the binding moral messages (i.e., "It is important to protect the natural environment of the places we live in. Our daily behaviors have a huge impact on the natural environment. Simply recycling, reducing consumption, using energy efficient appliances, and driving less can make a big difference.").

Measures

Predictor: Political Orientation — We measured participants' political orientation using Jost (2006)'s one-item political orientation scale ("Please rate how politically liberal versus conservative you see yourself as being."; 1 = *Extremely liberal* to 7 = *Extremely conservative*).

Outcome 1: Conservation Intentions — Conservation intentions were measured with Wolsko et al.'s (2016) 10-item scale (e.g., "Use reusable grocery bags", "Look for ways to re-use things", "Compost"; 1 = *Extremely Unlikely* to 7 = *Extremely Likely*). Participants were instructed to indicate the extent to which they would act on each of the pro-environmental behaviours in the future ("Now, consider the following set of activities related to protecting the natural environment that you may or may not currently participate in. Using the scale provided, please indicate HOW LIKELY it is that you will engage in each activity in the future."). We modified a few words in the instruction from the original scale to align it with our environmental messages; that is, we changed "fighting to protect the purity of the U.S. natural environment" into "protecting the natural environment". Higher scores indicate greater conservation intentions. We conducted a confirmatory factor analysis for this 10-item measure, using the *lavaan* package (Rosseel,

2) Because over 20% of the initial total participants were excluded following the pre-registered exclusion criteria, we conducted supplementary analyses excluding only 30 participants who indicated that their data should be removed. However, this change of the exclusion criteria did not alter the pattern of results, except that the association between political orientation and willingness to receive more information to protect the environment became statistically significant in the logistic regression (see Supplementary Materials Tables S2–S4 for the results of these analyses).

2012). All items statistically significantly loaded on the latent variable, but the model fit was below the acceptable level, $\chi^2(35) = 278.922$, $p < .001$; CFI = .888; RMSEA = .099 [.089, .110]; SRMR = .060. Adding the covariance of items 5 and 7 which share content overlap (i.e., "Use energy saving light bulbs" and "Turn off lights", respectively), improved model fit, $\chi^2(34) = 242.039$, $p < .001$; CFI = .904; RMSEA = .093 [.082, .104]; SRMR = .056. According to Hu and Bentler (1999), the model fit was satisfactory (CFI > .90 and SRMR < .06) despite an inflated RMSEA (> .06). In the present study, conservation intentions attained a good internal consistency ($\alpha = .83$).

Outcome 2: Willingness to Receive More Information — Participants indicated their willingness to receive more information regarding protecting the environment ("Would you like to receive more information about how to protect the environment in our daily lives?"; *Yes, I'd like more information* or *No, I don't want more information*). We informed participants that the information would be presented at the end of the survey. Participants who selected "Yes" were presented with the information about environmental protection (see Supplementary Materials Figure S1) after reading the debriefing information, whereas the survey finished for those who selected "No" after the debriefing information. The instruction and answers were adapted from the information seeking measure used in Vinnell et al. (2021).

Procedure

Participants randomly received either an environmental message emphasising loyalty/betrayal moral ($n = 168$), authority/subversion moral ($n = 164$), purity/degradation moral ($n = 183$), or a control condition environmental message ($n = 190$). To maximise participants' engagement with the messages, after reading one of the environmental messages, participants were asked to summarise the message in their own words. Participants were also asked to evaluate the message on a four-item semantic differential scale (i.e., *Negative* versus *Positive*, *Good* versus *Bad*, *Like* versus *Dislike*, and *Disagree* versus *Agree*). Participants then completed the outcome measures: their conservation intentions and willingness to receive more information. Following that, participants responded to other measures including the message recognition check, demographics, political orientation, and impacts of the COVID-19 pandemic. Participants received $0.50 (USD) after completing this survey.

Results and Discussion

Table 1 presents the descriptive statistics and intercorrelations among variables for the whole sample. As expected, political conservatism had statistically significant and negative correlations with conservation intentions ($r = -.30$, $p < .001$) and willingness to receive more information about environmental protection ($r = -.17$, $p < .001$).

Table 1

Mean, Standard Deviation, and Intercorrelations Among Variables

Variable	1	2	*M*	*SD*
1. Political orientation	—		3.51	1.77
2. Conservation intentions	−.30*	—	5.48	0.97
3. Willingness to receive more information about environmental protection	−.17*	.33*	0.32	0.47

Note. Willingness to receive more information about environmental protection (1 = *Yes*, 0 = *No*).
*$p < .001$.

To test the moderating effects of the environmental messages emphasising each binding moral between political conservatism and conservation intentions, we regressed participants' conservation intentions on their political orientation, three dummy-coded variables representing each pro-environmental message condition (the control condition was the reference group), and interaction terms between political orientation and three dummy-coded variables. Table 2 presents the results of the regression analysis. As expected, we found that political conservatism was statistically significantly and negatively predictive of conservation intentions, $b = -0.15$, $SE = .04$, $t(697) = -3.76$, $p < .001$, 95% CI [−0.23, −0.07], indicating that more conservative participants have lower intentions to engage in activities related to protecting the natural environment than more liberal participants. However, no interaction effects between political orientation and messages emerged. There was no evidence that the negative association between political conservatism and conservation intentions was statistically significantly alleviated by the environmental messages focusing on distinct binding morals. Because there were no statistically significant interaction effects in the regression model, we did not pursue the exploratory questions to identify relative differences between binding moral conditions in conservation intentions.

We subsequently tested whether the environmental messages framed with each binding moral affected participants' willingness to receive more information about environmental protection. Specifically, we conducted a logistic regression analysis regressing participants' willingness to receive more information about environmental protection on their political orientation, three dummy-coded variables, and interaction terms between political orientation and three dummy-coded variables. Table 3 presents the results of this logistic regression analysis. Political conservatism was not statistically significant in predicting willingness to receive more information about environmental protection on the log-odds scale, although the effect was in the expected direction ($b = -.17$, $SE = .09$, $z = -1.93$, $p = .054$). Notably, we found no statistically significant interaction effects between political orientation and binding moral messaging conditions on the dependent variable on the log-odds scale (see Table 3). Thus, there was no evidence that any

binding moral messages attenuated the political polarisation on willingness to receive more information about environmental protection, relative to the control condition.

Table 2

Regression Analysis Predicting Conservation Intentions

Variable	*b*	*SE*	*t*(697)	*p*	95% CI [*LL*, *UL*]
Constant	6.02	0.16	38.19	< .001	[5.71, 6.33]
Political Orientation (PO)	−0.15	0.04	−3.76	< .001	[−0.23, −0.07]
Loyalty/betrayal condition	−0.09	0.22	−0.39	.697	[−0.52, 0.35]
Authority/subversion condition	0.17	0.23	0.74	.462	[−0.28, 0.61]
Purity/degradation condition	0.08	0.22	0.39	.698	[−0.34, 0.51]
PO × loyalty/betrayal condition	0.03	0.06	0.48	.628	[−0.08, 0.14]
PO × authority/subversion condition	−0.06	0.06	−1.10	.272	[−0.17, 0.05]
PO × purity/degradation condition	−0.03	0.06	−0.46	.643	[−0.13, 0.08]

Note. PO = political orientation, CI = confidence interval, *LL* = lower limit, *UL* = upper limit. Messaging conditions were dummy-coded with the control condition as the reference group.

Table 3

Logistic Regression Analysis Predicting Willingness to Receive More Information About Environmental Protection

Variable	*b*	*SE*	*z*	*p*	95% CI [*LL*, *UL*]
Constant	0.12	0.35	0.35	.728	[−0.56, 0.81]
Political Orientation (PO)	−0.17	0.09	−1.93	.054	[−0.35, 0.0003]
Loyalty/betrayal condition	0.26	0.50	0.53	.599	[−0.72, 1.24]
Authority/subversion condition	−0.39	0.51	−0.76	.449	[−1.40, 0.61]
Purity/degradation condition	−0.39	0.49	−0.80	.422	[−1.36, 0.56]
PO × loyalty/betrayal condition	−0.20	0.14	−1.40	.161	[−0.47, 0.08]
PO × authority/subversion condition	0.01	0.13	0.05	.960	[−0.26, 0.27]
PO × purity/degradation condition	0.0002	0.13	0.002	.999	[−0.26, 0.26]

Note. PO = political orientation, CI = confidence interval, *LL* = lower limit, *UL* = upper limit. Messaging conditions were dummy-coded with the control condition as the reference group.

General Discussion

This research investigated whether environmental messages framed with each binding moral—loyalty/betrayal, authority/subversion, and purity/degradation—influenced participants' pro-environmental intentions over the political spectrum. Specifically, we tested the extent to which each binding moral reduced the political polarisation on both conservation intentions and willingness to receive information about environmental

protection. In the pilot study, we confirmed that the environmental messages we constructed identifiably communicated the intended moral foundations. Following that, we found that there were negative associations between participants' political conservatism and both conservation intentions and willingness to receive more information about protecting the environment. However, we found no evidence that the binding moral messages alleviated the negative relationships between political conservatism and both conservation intentions and willingness to receive more information about environmental protection, relative to the environmental message in the control condition. Therefore, we did not pursue the pre-registered research questions to test the relative magnitude of the effects in different conditions.

Our results supported the prevalent finding that political conservatism is negatively associated with pro-environmentalism (Hornsey et al., 2016; Pew Research Center, 2019). Consistent with Wolsko (2017) and Wolsko et al. (2016), we found that political conservatism was negatively correlated to conservation intentions. Although political conservatism did not statistically significantly predict willingness to receive more information about environmental protection in the logistic regression analysis, this association was statistically significant when increasing sample size in the supplementary analysis that disregarded pre-registered exclusion criteria (see Footnote 2). Because more conservative people are likely to avoid uncertainty and change (Jost, 2017; Jost et al., 2003), they tend to deny the threats of anthropogenic climate change and be reluctant to take pro-environmental behaviours that require behavioural changes (Hornsey et al., 2018; Jylhä et al., 2016; Milfont et al., 2021; Pew Research Center, 2019; Rutjens & van der Lee, 2020). Also, more conservative people tend to oppose pro-environmental policies because they think that these policies would undermine the economy and their economic liberty by regulating their business and behaviours (Feygina et al., 2010; Hornsey, 2021; Iyer et al., 2012). Thus, this research confirmed the tendency that more conservative people are less willing to act pro-environmentally than more liberal people.

However, we failed to conceptually replicate previous research which found the positive effects of incorporating binding morals in environmental messaging on attenuating the political polarisation on pro-environmentalism (e.g., Feinberg & Willer, 2013; Hurst & Stern, 2020; Kidwell et al., 2013; Wolsko et al., 2016). According to Moral Foundations Theory, people rely on moral foundations in making judgements on moral issues (Graham et al., 2009; Haidt & Graham, 2007). As a communication strategy, moral reframing can appeal to audiences and change both their attitudes and behaviours (Feinberg & Willer, 2013, 2015, 2019; Voelkel & Feinberg, 2018). Because more conservative people rely on binding moral foundations compared to more liberal people (Graham et al., 2009; Hurst & Stern, 2020), environmental messages emphasising binding morals reduced the political polarisation on pro-environmental attitudes, conservation intentions, and pro-environmental legislation support in previous studies (Feinberg & Willer, 2013; Kidwell et al., 2013; Wolsko et al., 2016). However, our research provided

no evidence that moral framing with a single binding moral is effective in inducing conservatives' conservation intentions and interests in information about protecting the environment. This replication failure challenged the theoretical perspective of moral reframing because more conservative people tend to endorse each binding moral foundation compared to more liberal people (Graham et al., 2009; Hurst & Stern, 2020; Iyer et al., 2012).

One explanation for this replication failure is that we emphasised a single binding moral rather than multiple binding morals in the same environmental messaging. Contrasting with previous studies which incorporated combinations of binding morals in a single environmental messaging (e.g., Kidwell et al., 2013; Wolsko et al., 2016), we tested the independent effects of the environmental messages framed with each binding moral on pro-environmentalism to find the most cost-effective strategy for pro-environmental campaign. Indeed, Çavdar (2021) and Feinberg and Willer (2013) only eliminated the political divide on pro-environmentalism with an environmental message emphasising a single binding moral (i.e., purity/degradation moral). Because conservatives rely on all the moral foundations to make moral judgements (Graham et al., 2009), emphasising a single binding moral may not be enough to persuade conservatives to enhance conservatives' conservation intentions and interest in protecting the environment. However, recent studies have also failed to enhance more conservative people's willingness to take pro-environmental behaviours with environmental messages incorporating multiple morals. Crawford (2018) failed to replicate the key findings of Wolsko et al. (2016, Study 3) in an unpublished pre-registered study. Moreover, Hurst and Stern (2020) did not find evidence that an environmental message incorporating all moral foundations promoted conservatives' pro-environmental intentions or interests. Considering substantial evidence of the moral reframing effects on pro-environmentalism (e.g., Feinberg & Willer, 2013; Hurst & Stern, 2020; Kidwell et al., 2013; Wolsko et al., 2016), future research should identify the specific conditions and contexts (e.g., single vs. multiple binding morals in environmental messaging, message topic, political context, dependent variables) in which moral-focused framing is effective for pro-environmentalism.

Strengths and Limitations

Our research had several strengths in its research design. We followed open science procedures (Nosek et al., 2019) and our final sample size attained high power to detect the effects. Moreover, we isolated the effects of the wording of each form of moral messaging on participants' pro-environmentalism relative to a control condition. However, our research also has limitations. First, our results were limited to a specific cultural context (i.e., Caucasian U.S. adults recruited on MTurk) and environmental outcomes (i.e., conservation intentions and willingness to receive more information about environmental protection). More importantly, the participants in the present study were biased to the liberal side (M = 3.51, SD = 1.77; 50.78% liberals). The skewness of the participants'

political orientations could have affected the outcomes and reliance on a liberal–conservative dimension might not clearly capture libertarians.

Moreover, we cannot exclude the possibility that the manipulation was not strong enough. The wording in the control environmental message condition could have been construed by participants as a binding moral messaging (i.e., "protect the natural environment of the places we live in"). Although the control environmental message did not include any of the specific binding moral words from the Moral Foundations Questionnaire (Graham et al., 2011) used in the binding moral messages, it could still have induced effects similar to those messages. Furthermore, the method used in the pilot study for manipulation check could not exclude the possibility that all messages were similar to each other. For example, participants who chose a binding moral description (e.g., authority/subversion moral) could have thought that other binding moral descriptions (e.g., loyalty/betrayal moral) could be the answer as well. Future research should ask participants to indicate the extent to which each message resembles a particular foundation to prove the distinctiveness among the messages. In addition, the present study did not have an individualising moral condition due to financial constraints, so we could not investigate whether environmental messages framed with only individualising morals backfire among more conservative people.

Lastly, we collected the data in the midst of the COVID-19 pandemic. Because the pandemic increased mental distress, anxiety and depression risk (Saladino et al., 2020; Sibley et al., 2020), participants' responses to environmental messaging could have been attenuated. However, knowing that the pandemic could have an impact on our findings, we asked participants to indicate their experience of the pandemic in comparison to other people and the impacts of the pandemic on their wellbeing. Only 7.51% of participants reported that their experience of the pandemic was a lot worse than average, and the pandemic very negatively impacted their wellbeing. Moreover, these pandemic questions were not statistically significantly correlated to political orientation, conservation intentions, and willingness to receive more information about environmental protection (ps > .158). In addition, the negative relationship between political orientation and pro-environmentalism identified in pre-pandemic studies was replicated in the current research. Hence, we did not have reason to suspect that the pandemic distorted our findings.

Future Research Directions

First, our environmental messages emphasising each binding moral could contain different aspects of the binding morals. Our study, along with previous literature (e.g., Feinberg & Willer, 2013; Hurst & Stern, 2020), did not distinguish between environmental messages matching conservatives' moral foundations (i.e., loyalty, authority, and purity) and threatening conservatives' moral foundations (i.e., betrayal, subversion, and degradation). To illustrate, a message that focuses on loyalty/betrayal morals could be positively-valenced by emphasising loyalty (e.g., "it is important to protect the natural

environment as a sign of loyalty to our country") or negatively-valenced by emphasising betrayal (e.g., "refusing to protect the natural environment is a betrayal to our people and country"). Negatively-valenced and threatening messages are often shown to backfire (e.g., Byrne & Hart, 2009; Hart & Nisbet, 2012; Myers et al., 2012; Schultz et al., 2007), in which people more strongly reject the message and the intended attitude. Thus, there is a possibility that our messaging was morally threatening and thus suppressed any positive effects of binding morals on pro-environmentalism. Future studies should distinguish these two different ways of framing with the moral foundations in the persuasiveness of the messaging.

Future research could also investigate the effect of environmental messages that emphasise the liberty moral. The liberty/oppression moral is more recent addition to Moral Foundations Theory (Haidt, 2012; Iyer et al., 2012) and conceptually relevant for pro-environmentalism (Hornsey, 2021; Hornsey et al., 2016; Hornsey & Fielding, 2017) because it encompasses governmental restrictions on individuals and businesses. Hurst and Stern (2020) and Wolsko (2017) tested environmental messaging that included liberty/oppression morals (e.g., "Making your own decisions on local land and water issues in the best interests of families, rather than leaving it to bureaucrats") and found those messages were linked with increased pro-environmentalism in more conservative people. Campbell and Kay (2014, Study 2) and Dixon et al. (2017) also found positive effects of a free-market friendly message (e.g., "how United States could help stop climate change and profit from leading the world in green technology") on conservatives' climate change beliefs. However, this prior research has examined beliefs and no studies have yet investigated whether liberty/oppression moral messaging predicts pro-environmental behaviours. Investigating the extent to which liberty/oppression-focused environmental messages attenuate the negative association between political conservatism and pro-environmental behaviours is a good direction for future research.

Conclusion

We investigated whether environmental messages focusing on each binding moral have independent effects on pro-environmentalism across the political spectrum, relative to a control environmental message. There was no evidence that environmental messages containing distinct binding morals attenuated the negative association between political conservatism and (1) conservation intentions or (2) willingness to receive more information about environmental protection. Thus, our results indicated that moral reframing with a single binding moral was ineffective in promoting more conservative people to act pro-environmentally or engage with environmental protection. Future research should investigate the conditions that affect moral reframing effects and identify environmental messaging that will be persuasive for politically diverse audiences.

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Author Contributions: *Inkuk Kim*—Idea, conceptualization | Data management (storage, curation, processing, etc.) | Data analysis | Data collection | Project coordination, administration | Research implementation (software, hardware, etc.) | Validation, reproduction, checking | Writing | Feedback, revisions. *Matthew D. Hammond*—Idea, conceptualization | Funding to conduct the work | Supervision, mentoring | Feedback, revisions. *Taciano L. Milfont*—Idea, conceptualization | Funding to conduct the work | Supervision, mentoring | Feedback, revisions.

Data Availability: For this article, data is freely available (Kim et al., 2023a).

Supplementary Materials

The following Supplementary Materials are available (for access see Index of Supplementary Materials below):

- Via the Open Science Framework (OSF) Registries: The pre-registration of the pilot and main study
- Via the OSF repository: Data sets, questionnaires, R scripts and outputs for both studies
- Via the PsychArchives repository: Additional materials, information, and results. This document includes Tables S1–S4 and Figure S1.

Index of Supplementary Materials

Kim, I., Hammond, M. D., & Milfont, T. L. (2021). *Supplementary materials to "Do environmental messages emphasising binding morals promote conservatives' pro-environmentalism? A pre-registered replication"* [Preregistration]. OSF Registries. https://doi.org/10.17605/osf.io/tgrp3

Kim, I., Hammond, M. D., & Milfont, T. L. (2023a). *Supplementary materials to "Do environmental messages emphasising binding morals promote conservatives' pro-environmentalism? A pre-registered replication"* [Data sets, questionnaires, R scripts and outputs]. OSF. https://osf.io/7trs5

Kim, I., Hammond, M. D., & Milfont, T. L. (2023b). *Supplementary materials to "Do environmental messages emphasising binding morals promote conservatives' pro-environmentalism? A pre-registered replication"* [Additional materials, information, and results]. PsychArchives. https://doi.org/10.23668/psycharchives.12515

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