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Relationships among Environmental Attitudes, Efficacy, and Pro-Environmental Behaviors

across 12 Countries

A Thesis submitted in partial satisfaction of the

requirements for the degree Master of Arts

in Communication

by

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March 2022

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March 2022

ABSTRACT

Relationships among Environmental Attitudes, Efficacy, and Pro-Environmental Behaviors

across 12 Countries

by

Lindsay B. Miller

As issues of environmental degradation become increasingly pressing and publicized,

it is imperative that scholars have a clear understanding of the forces that can lead individuals

to adopt pro-environmental behaviors (PEBs). Two such antecedents that have been widely

studied are pro-environmental attitudes and efficacy. Although ample research has been

published to explore the relationships between pro-environmental attitudes, efficacy, and

PEB, the field lacks a coherent understanding of the many subdimensions of these constructs

and the relationships between them. Furthermore, there is little research that explores how

these constructs may vary across countries—an understanding of which is vital to combat

such global phenomena. Finally, previous research indicates that media communication of

environmental issues can impact environmental attitudes and pro-environmental behavior;

however, further examination of various types of media use can elucidate which media

measures best relate to pro-environmental attitudes and behaviors across countries. Using

data from a large international survey ($N = 1,000$ adults in each of 12 countries) conducted in

2019 by Ipsos for the National Geographic society, this thesis attempts to clarify these central

constructs of environmental communication by testing the relationships between these

constructs and their subdimensions overall, and across countries.

Hierarchical linear regressions revealed that a general model, using the combined measures of these constructs, provided the best option for cross-country relationships between EA, efficacy, media, and PEB. Unexpectedly, a mismatch model examining environmental concern, self-efficacy, and public PEB provided the most variance explained on the combined (cross-country) sample. Although the fit of the models to individual country samples varied substantially, country-level differences explained less unique variance in the model than pro-environmental attitudes, and similar amounts of unique variance as the other model variables and controls.

The results show that environmental attitudes are a strong predictor of PEB across countries, and the direct and interactive relationships involving efficacy are very small and inconsistent across countries. The relative dominance of environmental attitudes as a predictor raises questions about the unique importance of efficacy in explaining PEB separate from attitudes. However, due to the small effect sizes and correlational nature of the data, it is unclear whether communication campaigns targeting pro-environmental attitudes can result in desired behavior change. The nuanced connections between these variables within individual countries highlight the importance of cross-national environmental research.

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Problem Statement

Environmental degradation is one of the most prominent public and political issues facing current generations (Hansen, 2011). Pollution, unsustainable consumption of resources, overpopulation, climate change, and mass extinction of animals and plants are just a few among many "wicked" environmental issues that result from a "lack of awareness of or concern about the consequences of consumption, inattention to human dependence on ecological realities, and the exceeding of planetary capacities" (Lehtonen, 2018, p. 860; United States Environmental Protection Agency, 2020). In order to combat the myriad environmental issues we face today, scholars must first understand the forces that drive individuals to engage in pro-environmental behavior (PEB).

Kollmuss and Agyeman (2002) define PEB as "behavior that consciously seeks to minimize the negative impact of one's actions on the natural and built world (e.g., minimize resource and energy consumption, use of non-toxic substances, reduce waste production;" p. 240). Although the impacts of our unsustainable lifestyles are becoming more apparent (Intergovernmental Panel on Climate Change [IPCC], 2021), extant research has demonstrated that many people do not take actions to engage in PEB (Leiserowitz et al., 2019). Even concerned individuals rarely change their behaviors to reduce their personal environmental impact (Appleby et al., 2017; Leiserowitz et al., 2019). Therefore, a better understanding of the antecedents of PEB will provide policymakers and designers of communication campaigns with the information they need to promote urgent changes in the way people act in relation to the environment.

Copious research has examined the role of environmental attitudes (EA) in influencing engagement in environmental action. Attitudes, or a person's cognitive and

affective evaluation of a given object, behavior, or situation, are known to partially guide behavior (Axelrod & Lehman, 1993; Bozorgparvar, 2018; Kim et al., 2013; Pratkanis & Greenwald, 1989). Because of this relationship, many environmental scholars view attitudes as a crucial antecedent to PEB (McDonald, 2014). Across ages, behavior types, and nationalities, scholars have found that people's pro-environmental attitudes can influence their behavioral intentions and enacted PEB (e.g., Axelrod & Lehman, 1993; Bilandzic & Kalch, 2022; Bozorgparvar, 2018; Hines et al., 1987; Kim et al., 2013; Lee et al., 2014; Meinhold & Malkus, 2005; Oreg & Katz-Gerro, 2006; Wang, 2017), though an abundance of null findings and inconsistencies in the literature suggest that the attitude-behavior relationship is complicated by many additional influences.

Methodologically, scholars have to manage the diverse definitions and methodological approaches in the literature that have obscured the attitude-behavior relationship. For example, extant findings suggest that large discrepancies occur when the operationalization of environmental attitudes is broader than the specific behavioral measure (e.g., attitude questions such as "do you care about nature?" paired with behavioral questions such as "do you use reusable shopping bags?"; Fishbein, 1979; Kollmuss & Agyeman, 2002). Indeed, the theory of planned behavior (TPB) notes that stronger relationships occur when measures of both attitudes and behaviors are specific (Ajzen, 1991; see also Kim, 2011 concerning green purchases). Nonetheless, Kaiser et al. (1999) argue that both environmental attitudes and behavior should be measured generally, partially because so many specific influences and challenges vary across individuals and contexts. Many researchers follow this methodological approach by using measures of global environmental attitudes in their research (e.g., Huang, 2016). In this thesis, I will test both approaches: first I will test a

general model made of composite measures of these constructs, and then I will examine models that separate the constructs on their subdimensions and then test the models using combinations of matches and mismatches among these domain subdimensions.

Ambiguity in the literature has also allowed for a wide and diverse number of EA measures (Milfont & Duckitt, 2010). Two of the most frequently used measures are the new environmental paradigm (NEP; Dunlap et al., 2000; Dunlap & Van Liere, 1978), which represents general ecocentric systems of beliefs without reference to any specific topic (Best & Mayerl, 2013), and the Environmental Attitude Inventory (EAI; Milfont & Duckitt, 2010), which "assesses broad perceptions regarding ecology and the factors affecting its quality" (AlMenhali et al., 2018).

Measures of PEB are no less diverse, as they can focus on various aspects of PEB including actions that directly benefit the environment, influencing others, supporting environmental policies, and lifestyle changes. Though each of the measures captures important dimensions of these constructs, their varied, and often haphazard, applications obscure nuances in the conceptualization of and relationships between the constructs.

In addition to the various methodological approaches, an abundance of null findings and inconsistencies in the literature suggest that the attitude-behavior relationship is complicated by additional influences. Frequently, pro-environmental attitudes show no significant relationship with PEB or are only weak predictors of behavior (Axelrod & Lehman, 1993; Heeren et al., 2016; Wu & Mweemba, 2010). Heeren et al. (2016) analyzed the influence of attitudes, knowledge, norms, and perceived behavioral control on each of 10 sustainability behaviors, finding much more variance explained when analyzed separately than when the behaviors were combined into one scale.

Another potential reason for the gap between attitudes and behavior is variations in individuals' sense of efficacy: the belief that they can enact solutions and make a difference. When individuals perceive that they cannot perform a specific action, or that their performance of that action will not be beneficial, they are unlikely to act on their pro-environmental attitudes regardless of their behavioral intentions (Ajzen, 1991; Bandura, 1997).

A related reason for weak and inconsistent links between attitudes and behavior is that even if individuals hold positive environmental attitudes and have a sense of efficacy, they cannot engage in PEB if they do not have the opportunities and resources to do so or if there are contexts such as social, national, and cultural forces opposing those attitudes or behaviors (Ajzen, 1991; Cheung et al., 1999; Kollmuss & Agyeman, 2002). Further, research has found other individual differences and contexts influencing PEBs, such as demographics.

The present study tests relationships (including direct and moderation) between pro-environmental attitudes, efficacy, and behaviors (and [mis]matches among their subdimensions), while also examining general and environmental media influences, overall, and within global contexts—across 12 countries—while controlling for demographics. The following sections discuss each in turn.

Environmental Attitudes: Values and Concern

Environmental attitudes can be defined as "a psychological tendency expressed by evaluating the natural environment with some degree of favour or disfavour" (Milfont & Duckitt, 2010, p. 80). These evaluative tendencies influence "beliefs, affects, and behaviours regarding human-environment relations" (p. 81). Two of the concepts that have shown considerable efficacy as indicators of environmental attitudes are *environmental values* and

environmental concern.

Valuing Nature

Schultz et al. (2005) note that much environmental attitudes research focuses on values, which provide a foundation for beliefs, attitudes, and behaviors. As many have argued, environmental values (desirable goals or guiding principles) are more general than environmental attitudes (valenced evaluations of a specific object or topic; Dietz et al., 2005; Milfont & Duckitt, 2010). Dietz et al. (2005) explain that "values differ from attitudes in that *attitudes* are positive or negative evaluations of something quite specific. We might value wilderness, and we might oppose a proposal for oil development in a wildlife refuge. The former is more general and would be considered a value; the latter is more specific and considered an attitude" (p. 346). Chan et al. (2016; reinforced by Jax et al., 2018; Neuteleers, 2020) argued that environmental values comprise instrumental, intrinsic, and relational (referring to personal and collective wellbeing) values, and that these are not mutually exclusive or independent.

Although many studies have found strong associations between environmental values and environmental attitudes (Dietz et al., 2005; Liu & Chen, 2020; St. John et al., 2019), researchers are again divided on their approach to values measurement. Some approaches group environmental values into instrumental, intrinsic, and relational (Chan et al., 2016; Neuteleers, 2020). In contrast, the Model of Ecological Values has examined environmental values in two dimensions: an individual's preservation and utilization values (Bogner & Weisman, 1999). Milfont and Duckitt (2010) relate preservation values to deep values and symbolic attitudes, and utilization values to self-interest and utilitarian concerns; similarly, Kaiser and Scheuthle (2003) measure moral/altruistic and utilitarian values as associated with

attitudes toward environmental behavior. The present study will measure environmental values using items from the Moral Conviction and Values Scale, which adopts the groupings of instrumental, intrinsic, and relational values (Chan et al., 2016).

Environmental Concern

Many researchers view environmental concern as an essential aspect of environmental attitudes. Early measures of environmental attitudes often used the two terms synonymously and relied on measures of environmental concern to evaluate environmental attitudes (Fransson & Gärling, 1999; Milfont, 2007; Weigel & Weigel, 1978). More recently, however, environmental concern is seen as only one component of environmental attitudes. For instance, Bamberg (2003) concluded that "environmental concern" seems to be part of a general attitude, and Schultz and colleagues (Schultz et al., 2004, 2005) have referred to "environmental concern" as the affect associated with an environmental attitude. Fransson and Gärling (1999) provide such an integrated definition: "Environmental concern has been treated as an evaluation of, or an attitude towards facts, one's own behaviour, or others' behaviour with consequences for the environment" (p. 370). Nonetheless, some researchers still conflate the two. For example, AlMenhali et al. (2018) stated that "environmental attitudes are more of an individual concern for the physical environment, which is related to the degree of cognitive, affective, and behavioral concerns toward the environmental problems" (p. 1). Some scholars distinguish between egoistic concern (focus on self) and biospheric concern (focus on all living things), from higher biosphere values corresponding with more positive environmental attitudes and PEB (Schultz et al., 2004). In the present study, "environmental concern" will be used only to refer to people's worries about environmental issues, as one component of "environmental attitudes" (Milfont, 2007).

Pro-environmental Behaviors: Private and Public

Because environmental issues are by definition public and global, and environmental behaviors involve both individual- and societal-level actions, some ambiguity exists about whether to examine environmental behavior at an individual or a collective level. Fundamentally, environmental problems arise from the moral hazard issue and associated negative externalities: performing PEBs often requires individuals to prioritize the long-term collective health of a region or the planet over their own individual interests. For example, environmentally-friendly actions such as recycling or taking alternative modes of transportation often result in immediate personal costs to the individual in the forms of time, expense, or inconvenience, but the environmental benefit of performing a pro-environmental action is rarely directly experienced by the individuals themselves (Culiberg, 2014; McCarty & Shrum, 2001). Furthermore, an individual's PEB is difficult to associate with larger outcomes (both perceived as well as actual; Thøgersen & Grønhoj, 2010). In contrast, individual rational behavior may generate benefits to self but costs (externalities) to others such as pollution, degradation of ecosystems, remediation costs, health problems, etc.

Some studies do not attempt to conceptualize distinctions among environmental behaviors, using measures that combine different aspects of PEB (e.g., Abraham et al., 2015; Axelrod & Lehmen, 1993; Berger & Corbin, 1992; Chen, 2015; Heeren et al., 2016; Homburg & Stolberg, 2006; Huang, 2016; Lee & Holden, 1999; Lee et al., 2014; Oh et al., 2020; Oreg & Katz-Gerro, 2006; Rice et al., 1996; Wu & Mweemba, 2010). However, just as pro-environmental attitudes can be measured specifically rather than globally, researchers also need to consider distinct ways to enact PEB and distinguish them as necessary (noted above).

A general distinction is between private sphere and public sphere environmental behaviors. *Private sphere* behaviors are considered to be direct and impact-oriented (e.g., recycling), while *public sphere* behaviors are often indirect in that they can signal the intention to enact pro-environmental behaviors through symbolic commitment to environmental efforts (e.g., signing a petition for an environmental cause; note that private and public sphere here do not represent the colloquial meaning of private as being unobservable by others and public as being consciously observable by others; Gan & Gal, 2018; Piyapong, 2020; Stern, 2000; Tam & Chan, 2017). Some researchers consider "influencing others" as a separate facet of PEB (Hanss & Böhm, 2010); based on the above discussion, however, influencing others can be considered an indirect and a public sphere behavior. Piyapong (2020) further distinguishes public sphere (intent-oriented) behaviors into non-activist and activist. Homburg and Stolberg (2006) consider nonactivist behaviors as a form of social commitment, such as engaging in environmental protection actions. Chen (2015) measures public nonactivist behavior as "specific social commitments" such as planting trees and picking up litter on the beach.

Some conceptualizations of private PEB refer to the individual benefits that people accrue from performing green behaviors (termed "shallow green behavior" by Feng & Reisner, 2011). Public behaviors that do not specifically, immediately, or directly benefit the participant, such as advocacy and participating in NGO events, are by contrast deemed "deeper" environmentalism. This distinction does not always work, however; while socially beneficial behaviors such as reducing electricity consumption can also lower an individual's utilities cost, other behaviors such as recycling often require individuals to devote effort to separating recyclables and paying for the bin and collection, without obvious or direct

individual benefit.

Based on this discussion, I define *private PEB* as behaviors that single individuals can take to benefit the environment directly (e.g., recycling, shopping with reusable bags), and *public PEB* as behaviors that require group organization to benefit the environment either directly (e.g., volunteering to plant trees) or indirectly (e.g., signing a petition to support an environmental cause).

Efficacy: Self and Collective

Drawing on protection motivation theory, the cognitive theory of stress, and the theory of planned behavior (TPB), scholars have pointed to the role of efficacy in enabling or motivating individuals to translate attitudes into concrete action (McDonald, 2014). Efficacy, or the belief that one has capabilities to "organize and execute the courses of action required to produce given attainments," allows individuals to feel that their actions are worthwhile and achievable (Bandura, 1997, p. 3). Therefore, efficacy is an important influence on action. There are a few main types of efficacy, corresponding with beliefs about one's own capability (self-efficacy), and about the capabilities of a group to achieve a solution (collective efficacy).

Self-Efficacy

Individual self-efficacy typically consists of two components: (a) whether the person believes that they can perform a given action, and (b) whether the given action will have the intended effect (Bandura, 1997; Becheur & Das, 2018; Tabernero & Hernández, 2011). Although some scholars isolate the second component of self-efficacy as "response efficacy" and include only the first component in their conceptualization of self-efficacy, the majority of self-efficacy measures draw from Bandura's conceptualization and include both

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components (e.g., Hamann & Rees, 2020; Tabernero & Hernández, 2011). Self-efficacy also includes the ability to overcome some barriers in performing a behavior (Kim et al., 2013), and is conceptually similar to perceived behavioral control in the TPB (Ajzen, 1991; Gould et al., 2018; Kim et al., 2013). Generally considered domain-specific (Bandura, 1997), self-efficacy strengthens motivation and behavioral intentions (Abraham et al., 2015; Huang, 2016; Tabernero & Hernández, 2011). Both components of self-efficacy, through increasing a sense of empowerment and effectiveness, should motivate relevant environmental behavior (Gould et al., 2018).

Collective Efficacy

Bandura (1997) conceptualized collective efficacy as "a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments" (p. 477). Like individual self-efficacy, collective efficacy also includes two components. Here, they are (a) whether a group believes that they collectively can perform a certain behavior, and (b) whether the behavior has the desired effect (collective response efficacy).

Barth et al. (2016) explain that perceptions of collective efficacy "should foster individuals' actions towards collective goals by increasing their perception that their personal behavior is a movement towards collective change" (p. 66). Therefore, perceived collective efficacy can allow individuals to believe that group efforts may matter even though individual efforts are insufficient (Barth et al., 2016; a related approach is the social identity model of collective action: see Rees & Bamberg, 2014). Chen (2015) further clarifies that collective efficacy is an "emergent group-level property and not merely the sum of the efficacy beliefs of the individual members" (p. 69), and that the group must rely on collective

rather than individual resources. The domain of collective efficacy may also be distinguished. However, for sustainable development issues, Hanss and Böhm (2010) found that "in this country" and "around the world" did not represent different facets of geographical collectivity.

Lubell (2002) highlighted that, based on the collective interest model, people are likely to take into account the efficacy of the group when determining behavior as it would not be highly rational to allocate effort to a group with low effectiveness. Thus, collective efficacy may increase individual self-efficacy, in turn increasing PEB (Reese & Junge, 2017). Conversely, Olson (1965) describes a paradox where collective efficacy could eventually lead to inaction because a single member's behavior may then seem unnecessary or insubstantial for goal achievement (Hamman and Reese [2020] note that Olson's point is more relevant for much larger groups, including "humanity"). This is similar to social loafing (Latané et al., 1979), free-riding (Lam, 2006; Nordhaus, 2015), the moral hazard (Rauchhaus, 2009), and the negative displacement effect of incentives on donations (Gneezy et al., 2011).

Thus, in general, the belief that one, personally, is capable of performing actions to achieve a goal is a stronger motivator of individual action than is the belief that one's group can make a difference. Indeed, individual self-efficacy may be somewhat necessary for perceived collective efficacy to influence individual behavior intentions, especially in large-scale environmental contexts (Jugert et al., 2016).

Relationships of Self-Efficacy to Environmental Attitudes and Pro-Environmental Behaviors

In general, efficacy could play at least three causal roles related to behaviors: as a direct effect on behaviors, as a mediator or intervening role between attitudes and behaviors,

and as a moderator or interaction role of the attitude-behavior relationship. The next three subsections summarize these three approaches in terms of theoretical justification and empirical results. The Appendix lists 43 relevant references and their sample, topic, model role of efficacy, type of efficacy, type of PEB, and whether the relationship was significant.

Direct

Most of the research on the role of efficacy in PEB focuses on direct effects. Researchers consistently find that higher levels of efficacy lead to increased engagement in a wide range of PEB (see Appendix; for example, Abraham et al., 2015; Chen, 2015; Hamann & Reese, 2020; Jugert et al., 2016). The theoretical basis for this direct effect is grounded in the TPB (Cheung et al., 1999; Heeren et al., 2016; Oreg & Katz-Gerro, 2006; Wang, 2019), social cognitive theory (SCT; Doherty & Webler, 2016; Hamann & Reese, 2020), and protection motivation theory (PMT; Kim et al., 2013; Wang, 2019). These theories indicate that self-efficacy focuses attention (Kanfer et al., 1996), affects perception of goal difficulty and goal commitment (Locke & Latham, 2002), helps assign resources to the goal (Vancouver et al., 2008), and fosters searching for better strategies (Tabernero & Wood, 1999; as summarized by Tabernero & Hernandez, 2011, p. 611).

Moderation

There are far fewer studies proposing or testing a moderation effect of efficacy. Several studies do not find a moderating role of self-efficacy on the relationship between attitudes and pro-social or pro-environmental behaviors (Anker et al., 2010; Bozorgparvar, 2018; Kim, 2011; Meinhold & Malkus, 2005; Thøgersen & Grønhøj, 2010), yet there is reasonable theoretical justification for this role.

Attitudes can be seen as performance expectancies weighted by their valences

(Fishbein & Ajzen, 1975). In that perspective, efficacy can interact with or moderate performance expectancies and outcome valences, and thus play the role of a moderator of the attitude-behavior relationships (i.e., environmentally responsible behaviors; Berger & Corbin, 1992). Furthermore, in the emotion literature, the original protection motivation theory (PMT) suggested that threat and coping appraisals would interact to affect individuals' responses to fear appeals (Rogers, 1975). Although later tests of these hypotheses failed to find an interaction, leading to a reformulation of the PMT (Maddux & Rogers, 1983), Marceron and Rohrbeck (2019) suggest that this failure might have been due to an absence of individuals with low levels of self-efficacy in the authors' samples, rather than an error with the initial theory. Indeed, in their examination of emergency preparedness behaviors among individuals with physical disabilities, Marceron and Rohrbeck (2019) revealed a moderating role of self-efficacy on the relationship between perceived threat and emergency preparedness behaviors. Furthermore, the authors discovered that minimal relationship exists between perceived threat and preparedness in the absence of perceived self-efficacy (Marceron & Rohrbeck, 2019).

A few studies have shown significant moderation effects of self-efficacy on the attitude-behavior relationship, suggesting that the more an individual perceives that they are able to take effective action, the more likely they are to engage in behavior consistent with their attitudes. In a study of consumers' willingness to act on their environmental attitudes in their purchasing behaviors, Berger and Corbin (1992) demonstrated that both individuals' own perceived consumer effectiveness and their faith in the efficacy of others moderated the relationship between participants' attitudes and behaviors. Self-efficacy has also been shown to moderate the relationships between behavior and other behavioral antecedents: Drawing

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on the risk perception attitude (RPA) framework that posits that efficacy beliefs moderate the relationship between risk perceptions and behavior, Rimal et al. (2009) demonstrated that efficacy beliefs moderated the relationship between risk perception and intentions to remain monogamous. In Oh et al.'s (2020) study, environmental self-efficacy significantly moderated the relationship between viewing a 360-degree video (as opposed to a unidirectional video) on their intentions to protect the environment.

Mediation

Some research has examined the role of efficacy as a mediator, whereby attitudes are related to self-efficacy, which is related to behavior. Studies finding significant mediation effects of efficacy include Anker et al. (2010), Axelrod and Lehmen (1993), Matley and Davies (2018), Morton et al. (2011), Rees and Junge (2017), Sharon et al. (2020), Walton and Austin (2011), and Wu and Mweemba (2010).

Most theoretical justification for the mediational role of efficacy comes from other areas besides environmental psychology or communication, such as health behavior. These scholars point to the extended parallel process model, the health belief model, PMT, and SCT to demonstrate mediation pathways (see brief review by Knerr et al., 2016). For example, in the compensatory health beliefs model, self-efficacy improves resistance to desires as well as strengthens the belief that compensatory behavior is possible (such as reducing alcohol use; Matley & Davies, 2018).

Nevertheless, significant mediation results have been found in the environmental or pro-social domain (e.g., Berger & Corbin 1992, Kim, 2011; Lee & Holden, 1999; Meinhold & Malkus, 2005; Oh et al., 2020; Walton & Austin, 2011). For example, Morton et al. (2011) justified their examination of efficacy as a mediator of attitude framing and PEB by referring

to the health literature. Yao and Enright (2020) argue that prosocial attitudes (valuing helping others) can provide the basis for prosocial self-efficacy, which in turn fosters prosocial behavior. Thøgersen and Grønhøøj (2010), examining electricity consumption in households, noted that self-efficacy can be influenced by prior behavioral experiences, including vicarious experiences through observing others and modeled behavior. However, because of the cross-sectional nature of the data and critiques of mediation analyses (Fiedler et al., 2011; Fiedler et al., 2018; Green et al., 2010; Montgomery et al., 2018), the mediation approach will not be pursued in this thesis.

(Mis)Matching Subdimensions

An implication of the distinctions noted in the review so far is that more subtle approaches to the relationships among attitudes, efficacy, and PEB would take into account the distinctions within environmental attitudes (values/concerns), within efficacy (individual/collective), and within PEB (private/public). As noted in TPB research, more domain-specific attitudes are more likely to be related to more domain-specific behaviors. Similarly, types of efficacy should be matched with types of environmental behavior to elucidate the most justifiable relationships between variables (Wang, 2018). In the context of environmental behaviors, distinguishing between self- and collective efficacy is especially relevant because, as described above, individual actions are insufficient for most environmental problems (Hamann & Reese, 2020; Jugert et al., 2016; Wang, 2018), given the societal and global nature of environmental causes and issues (Chen, 2015; Homburg & Stolberg, 2006; Reese & Junge, 2017). For example, Hamann and Reese (2020) reported that self-efficacy predicted private PEB, but the relationship between collective efficacy and public PEB remains unclear. Their study 1 found significant effects of self-efficacy on

private PEB, and effects of collective efficacy on public PEB, while their study 2 found self-efficacy also predicted public PEB, but collective efficacy negatively predicted public and activist PEB. Indeed, the mismatch of general attitudes with specific PEBs, and an emphasis on individual self-efficacy for collective problems or on collective efficacy for individual problems, may help explain the limited or inconsistent relationship between environmental attitudes and PEB (Chen, 2015). Thus the above direct effects and moderation models will be tested using the three general concepts, as well as using the concepts' subdimensions, and various combinations of those subdimensions.

News and Environmental Communication in the Media

Although extreme weather events are occurring with increasing frequency and severity (IPCC, 2021), most individuals do not directly experience environmental issues without extensive travel and/or scientific knowledge (McDonald et al., 2015). Many individuals, therefore, obtain information about the environment through different types of media (Klinger & Metag, 2021). Not surprisingly, the mass media and the Internet's readily accessible, nearly ubiquitous, and frequently updated content has made them the central platforms from which nonexpert audiences receive most of their environmental information (Dahlstrom, 2014; Hansen, 2011; National Science Board, 2018; Taddicken, 2013). Beyond increasing knowledge of environmental issues, media communication also influences people's awareness of environmental issues, their perception and assessment of environmental issues, their behavior in relation to the environment, and their emotions about environmental topics (Klinger & Metag, 2021).

Because of the media's central role in communicating environmental issues, news and environmental media exposure in general may influence all three of this study's primary

model variables: environmental attitudes, efficacy, and PEB. However, as with those central concepts, different measures of media use can provide more nuanced understandings of environmental media exposure. Therefore, media exposure will be incorporated into the analyses in three ways: by examining exposure to general news media and exposure to environmental media content on individuals' pro-environmental attitudes and by exploring how mediated civic activism relates to PEB. Although tests of all the (mis)matching subdimensions of the media variables with the subdimensions of pro-environmental attitudes, efficacy, and PEB is beyond the scope of this thesis, pertinent bivariate relationships will be explored as research questions. Each of these indicators and their suggested relationships are reviewed below.

Media Exposure: General News and Environmental Content

This section first provides general reviews of the potential influences of media on the three central concepts—attitudes, efficacy, and PEB. It then considers general relationships of the media measures with the general and subdimensions of the three concepts.

Media Exposure and Environmental Attitudes

Based on the conceptualization of this study's three model variables, both the exposure to general news media and to environmental media content likely influence environmental attitudes. According to this study's conceptualization, environmental attitudes are indicated by both environmental values and environmental concern. Environmental concern may be especially susceptible to media communication about environmental issues. Although environmental values are general guiding principles that often remain stable over time (Dietz et al., 2005; Milfont & Duckitt, 2010), environmental concern represents people's worries about environmental issues, which can vary depending on people's

knowledge of environmental issues (Olivos et al., 2021), the salience of specific environmental consequences (Herrnstadt & Muehlegger, 2014; Jenner, 2012), and the affect associated with an environmental attitude (Schultz et al., 2004, 2005)—all of which can be influenced by exposure to various types of media. Media coverage emphasizes one topic or issue over another, with changes over time and media, generating agenda-setting and media framing effects (Klinger & Metag, 2021).

Copious research has supported the relationship between media use and environmental attitudes (e.g., Klinger & Metag). Extant findings have demonstrated that media use is related to climate awareness (Arlt et al., 2011), attitude changes about nuclear energy (Arlt & Wolling, 2016), perceptions of risks and benefits of genetically modified foods (Frewer et al., 2002), and concern about climate change (Lowe et al., 2006). Furthermore, the relationship between media exposure and environmental attitudes appears stable across time and sociodemographic variables. Frewer et al. (2002) demonstrated that an increase in media coverage of genetically modified foods predicted attitude change for a year after media coverage decreased, and Arlt et al. (2011) demonstrated that the relationship between media usage and climate awareness remained even after controlling for personal values and sociodemographic variables. Because of the strong justification for media's influence on environmental attitudes, this study proposes direct relationships between the exposure to general news media and pro-environmental attitudes, and between exposure to environmental media content and pro-environmental attitudes.

Media Exposure and Efficacy

Although fewer studies examine the relationship between media communication of environmental issues and efficacy, research in health and political domains indicate media

can also enhance people's self- and response efficacy, and that a sense of self-efficacy can drive media use. First, media content can explicitly mention efficacy components. For example, during the Ebola outbreak between March 2014 and March 2015, Mitchell Turner et al. (2021) found that 31.5% of radio content, 23.6% of radio programming, and 10.6% of newspaper content included at least one mention of self-efficacy, while 25.2% of radio, 16.4% of radio programming, and 15% of newspaper content included at least one mention of response efficacy. Beyond efficacy content, the behavior of media characters can also affect efficacy levels in consumers. In a study of sexual risk behavior, Træen et al. (2014) found that the consumption of sexually explicit media depicting condom use was related to participants' self-efficacy in their own condom use, and that this self-efficacy was related to participants' sexual risk behavior. In addition, the heightened efficacy that consumers derive from the media may be self-reinforcing; Lu and Luqiu (2020) demonstrated that people who felt a sense of political efficacy were more likely to engage with news organizations and content, which can provide additional opportunities for the media to communicate additional efficacy information. Although these studies suggest that media exposure may influence efficacy to some extent, support for this relationship within the environmental literature is limited. Therefore, this thesis will only include the direct relationships between media exposure variables and pro-environmental attitudes in the proposed models.

Media Exposure and PEB

Most research on the relationship between media consumption and PEB has measured PEB intentions rather than enacted behaviors (Klinger & Metag, 2021). Although these findings suggest that media will influence subsequent PEB, behavior intention does not always predict later behavior (e.g., Ajzen, 1991), and the strength of these findings should be

treated with caution. However, in a few studies that measured enacted behavior, a relationship between media consumption and PEB emerged. For example, Chen et al. (2019) demonstrated that when the media admit that climate change is occurring, major media coverage of both climate change and global warming has a positive impact on hybrid vehicle sales. Östman (2014) also found a positive relationship between "the frequency with which adolescents consume news via mass media outlets and the extent to which they engage in pro-environmental behavior," despite their low levels of news media use (less than one to two times per week; p. 103). This finding is particularly noteworthy, given that adolescents will bear a disproportionate burden in addressing climate change impacts.

The relationship between media exposure and PEB certainly warrants further research; however, as stated above, this thesis will include media exposures as controls in the overall model, but only specifically consider the relationships between media exposure variables and pro-environmental attitudes in the proposed models.

Media Sources: Variation by Medium

All media are not created equal or used equally, and the different characteristics and purposes of each media channel can lead to heterogeneous effects. Because of the media's central role in disseminating environmental information, differential access to, or use of, various media platforms may lead to different levels of environmental knowledge and attitudes (Arlt et al., 2011; Feldman et al., 2012; Gore & Knuth, 2009). Although scholars agree that different media channels produce varying effects, there is little consensus on the specific influences of each channel. For example, Nisbet et al. (2015), Thaker et al. (2017), and Zhao (2009) found that use of newspaper and other print media was associated with climate change knowledge (Nisbet et al, 2015; Zhao, 2009), beliefs (Thaker et al., 2017), and

risk perception (Thaker et al., 2017). In contrast, Arlt et al. (2011) found a slight negative effect of print media on problem awareness and Siemer et al. (2009) found that print media was not a predictor of environmental concerns. The impact of television on environmental knowledge and attitudes is similarly controversial. Although scholars suggest that the visual aspect of television can increase recall (Schill, 2012), arouse emotion (Smith & Joffe, 2009), and promote understanding of abstract global issues (Beck, 2009), and Siemer et al. (2009) found that TV viewing influences concerns towards black bears, other empirical evidence suggests that television exposure has either no (Zhao 2009) or negative (Nisbet et al., 2015) influences on environmental knowledge and attitudes.

The impacts of new media ("media which are integrated, interactive, and use digital code"; O'Neill & Boykoff, 2010, p. 233) on environmental attitudes may be even more nuanced. New media differ from mass media across three key attributes: "the ability to deliver individualized messages simultaneously to those with access; the control of the content shared by each individual involved; and the dependence of new media on technology" (O'Neill & Boykoff, 2010, p. 234). New media channels often have larger audiences (Painter et al., 2017) and greater coverage of climate change (Boykoff, 2011) than traditional media sources. However, the tailored algorithms of new media also increase the possibility of selective exposure, meaning that new media channels may not reach audiences who are most in need of or are not supportive of the environmental information (Boykoff, 2011; O'Neil & Boykoff, 2010). Indeed, Östman (2014) suggested that "the individualized news experience associated with online news consumption involves less powerful agenda-setting mechanisms, relative to mainstream news," which may lead to weaker environmental attitudes (p. 103). However, other scholars have noted that media exposure is more effective

when engaged in actively rather than passively (Arlt et al., 2018), which suggests that the more interactive nature of new media could be more effective at enforcing pro-environmental attitudes among those exposed.

Thus, this thesis takes an exploratory look at how news and environmental media exposure are related to the two subdimensions of environmental attitude.

Mediated Civic Activism

In some cases, individuals may participate in the creation of new media content, through media activism behaviors such as writing articles for publication or posting to online forums or blogs. New media channels make many civic activism behaviors more accessible, as they allow individuals to engage in these behaviors on their own time and from the comfort of their home. Furthermore, engagement in some mediated civic activism behaviors may promote engagement in others (for example, PEBs). The reasoning behind this is twofold: first, many civic activism behaviors integrate individuals into a network of other activists, who can then provide additional opportunities for civic engagement (Botetzagias & van Schuur, 2012; Farrell, 2013; Omoto et al., 2010). Second, individuals can integrate their activism behaviors into their social identity (Botetzagias & van Schuur, 2012; Omoto et al., 2010; Schulte et al., 2020), which can then inspire additional identity-consistent activism behaviors (Omoto et al., 2010). Because individuals who perform certain activism behaviors are likely to perform other pro-social behaviors, this study will examine the direct relationship between mediated civic activism behaviors and PEB. As with the news and environmental media exposure relationships, the thesis will also take an exploratory look at how mediated civic activism is associated with the two subdimensions of PEB.

D. Summary of Research Approach for Media Variables

This thesis proposes direct relationships between the exposure to general news media and pro-environmental attitudes, between exposure to environmental media content and pro-environmental attitudes, and between mediated civic activism and PEB. A more nuanced approach would test for interactions between media and additional study variables; however, for the sake of parsimony, only these direct relationships will be explored, in additional to including all three as controls in the overall models.

These proposed relationships will be incorporated into each of the models for analysis. First, the relationships above will be examined within the general overall models with pro-environmental attitudes, efficacy, and PEB, with efficacy playing either a direct or moderating role. After hypothesis testing of the general models, the media relationships will be retained as controls while testing models with distinctions among subdimensions of the main model variables (pro-environmental attitudes, efficacy, and PEB). Further, these same media relationships will be used as controls in the tests for specific combinations ([mis]matches) of the previous hypotheses. Each of these models and corresponding hypotheses are described below. Throughout, the media variables will be specifically assessed only as to the extent that they affect pro-environmental attitudes. In the case of exposure to general news media and exposure to environmental media content, and PEB, in the case of mediated civic activism. Finally, specific relationships between media variables and subdimensions of pro-environmental attitudes and of PEB will be examined as research questions.

The Importance of a Global Perspective

There are many reasons why pro-environmental attitudes, efficacy, PEB, media coverage and use, and the relationships between these constructs could differ across

countries. The cultural, social, media, and political contexts of each country vary dramatically, which can influence the media coverage of environmental issues, people's attitudes towards the environment, and the ease of performing PEB. Even general collectivist and individualist values may affect people's understanding of their personal role in environmental degradation (Chwialkowska et al., 2020).

Global Variation: Media

The media's portrayal of environmental issues is not uniform across countries, which can spur differences in environmental attitudes across countries (Klinger & Metag, 2021). Both the content and presentation of mediated information are framed to reflect the norms and values of social systems (Boykoff, 2011; O'Neill et al., 2015). These frames change across time periods, major events, and available narratives and visuals, all of which can vary by country (O'Neill et al., 2015). For example, in an examination of 150,000 top print news articles published between 1996 to 2010 across 27 countries, Shäfer et al. (2012) found that countries that signed the Kyoto Protocol had higher coverage of climate change issues than those that did not, but there was no significant difference in climate change coverage between countries that were more or less vulnerable to climate change impacts.

Importantly, countries vary in the extent to which media coverage describes controversy surrounding environmental issues. Media attention to this minority viewpoint— that anthropogenic environmental impacts are debated—can increase uncertainty around environmental science, promote skepticism and cynicism about future environmental claims, and reduce public support for climate mitigation and adaptation policies (Boykoff, 2008; Boykoff, 2013; McComas & Shanahan, 1999). The United States' history of balanced reporting to embrace the journalistic ideal of objectivity (Boykoff, 2008; Olausson, 2009) has

led U.S. media, in particular, to advance the perception of environmental controversy in the absence of real scientific controversy (IPCC, 2021; Leiserowitz et al., 2020). Previous research has demonstrated that media in the United States (and to a lesser extent in the United Kingdom) report much more climate skepticism and scientific controversy around the occurrence of climate change and environmental issues in general than media in other countries, including France (Olausson, 2009; Painter & Ashe, 2012), China (Painter & Ashe, 2012), Brazil (Painter & Ashe, 2012), India (Painter & Ashe, 2012), Argentina (Zamith et al., 2013), and Columbia (Zamith et al., 2013). Although U.S. media are no longer "balanced" in terms of reporting both natural and anthropogenic causes of climate change, dissenting views and controversies are still discussed and debated (Smith & Joffe, 2009), perpetuating a sense of uncertainty in American media consumers (Gustafson & Rice, 2020; Rebich-Hespanha et al., 2015; Rice et al., 2018).

Political contexts can also shape the media's reporting of environmental issues. Political backdrops influence the kind of information that the media can "sell" to audiences, leading people with more political power to shape the interpretations of environmental issues (Boykoff, 2011). In some cases, governments exert substantial control over media reporting of environmental issues, resulting in censorship and a reduction in residents' abilities to access environmental information (Klinger & Metag, 2021). Measures of press freedom, "the ability to formally gather and disseminate knowledge, creative expression, and ideas," highlight the variability between countries in barriers to newsgathering, publication, broadcasting, and speech (Martin et al., 2016, p. 95). Freedom House maintains one such measure of media freedom based on the United Nations Universal Declaration of Human Rights by assigning each country a total press freedom score from zero (best) to 100 (worst),

according to data on the countries' legal, political, and economic systems (Martin et al., 2016). Because governmental censorship can impede individuals' access to environmental knowledge and manipulate their environmental attitudes and efficacy, individuals who reside in countries that score high on press freedom are likely to report weaker environmental attitudes and efficacy, and fewer PEBs, along with weaker relationships among them.

Beyond shaping media reporting, social systems can also influence the ways that individuals respond to and make sense of media information. The social system in which individuals are embedded can influence their political ideology, cultural worldview, interest in the environmental issue, and skeptical preconceptions, all of which are factors that Klinger and Metag (2021) suggest can strongly influence media effects. These factors can lead individuals to both selectively expose themselves to media that align with their own political ideology or cultural worldview (Newman et al., 2018), and to selectively attend to, process, and interpret the mediated information in a way that confirms their preexisting beliefs (Klinger & Metag, 2021; Newman et al., 2018).

Although the above review suggests that media's influence on environmental attitudes varies by country and social system, Klinger and Metag (2021) stress that "international comparative research is scarce in the field of media effects in environmental communication" (p. 26). Most research on media communication and climate change is limited to northern developed countries, even though countries in the Global South are most vulnerable to climate change impacts (Boykoff, 2011). Klinger and Metag (2021) suggest that "putting these differences more at the center of media effects research in environmental communication would help in deriving more tailored recommendations for actions, depending on different countries and cultures" (p. 26).

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Global Variation: Prioritization of Environmental Issues

Beyond media exposure, countries also differ in their prioritization of environmental issues. In particular, Table 1 summarizes some environmental contexts of the countries in this study. For example, in Brazil and Australia, deep histories of environmentalism have led voters to prioritize the environment as a central political issue, while in Indonesia, the multi-billion-dollar palm oil industry has led to incentivized deforestation in what some call a "modern-day gold rush" (Hochstetler & Keck, 2007; Vijay et al., 2016). These diverse physical and climate environments, as well as heterogeneous infrastructure, policies, assumptions, and economic availability regarding environmental issues can all influence individuals' abilities to translate attitudes into action. In addition, studies have found differences in concerns about and attitudes toward environmental problems across the rural-urban continuum (Williams & Moore, 1991), and even those differences vary by issue salience, type of location (e.g., farm vs. nonfarm rural), economics, occupation, access to resources, rural culture and norms, etc.

-- Table 1 --

There is a substantial number of studies conducted outside of the United States that examine environmental attitudes and PEB (see Appendix). Many studies involve samples from one or two countries: Australia, Canada, China, Denmark, Germany, Iran, Israel, Indonesia, South Korea, Spain, Taiwan, Thailand, United Kingdom, and Zambia; e.g., Homburg & Stolberg, 2006; Rees & Junge, 2017; Huang 2016). However, scholars rarely compare findings across countries. In the few studies that do, the strength of the attitude-behavior connection varies. For example, in an analysis of environmental attitudes and sustainable consumption behaviors in 31 countries, Wang (2017) found that in low-income

countries, individual attitudes are stronger predictors of sustainable behaviors under high levels of environmental governance and are weaker predictors of PEB when environmental governance is lacking. Oreg and Katz-Gerro (2006) ran a multilevel model on a sample of 31,042 participants in 27 countries and discovered that country-level postmaterialism values influenced participants' level of environmental attitudes, which then predicted their environmental behaviors. Finally, in a comparison of Korean and American participants, Kim et al. (2013) found that self-efficacy was a stronger predictor of PEB among the American rather than Korean participants. A central goal of the present study is to provide this global perspective using survey data from 12 diverse countries, identifying commonalities and differences in the relationships. However, this thesis does not propose hypotheses about country-level differences, as it uses only individual-level data from these countries.

Selected Controls/Covariates

Research has identified a wide variety of other influences, here conceptualized as control variables, on environmental attitudes and behaviors. Among others, these include age, gender, education, geographic location, income, social class, and social norms (Eden, 1993; Kim et al., 2013; Lam, 2006; McDonald, 2014; Piyapong, 2020).

Models, Hypotheses, and Research Questions Relating Environmental Attitudes, Efficacy, and Pro-Environmental Behaviors

The following sections identify hypotheses and research questions for general models (direct and moderation effects) with single dimensions, general models with subdimensions (direct and moderation effects), (mis)match models with subdimensions (direct and moderation effects), research questions for media relationships with the relevant subdimensions, and research questions for separate country models.

General Model

General Model with Single Dimensions

Based on the above reviews, the primary focus of the thesis is on a general model: Pro-environmental attitudes are related to PEB; and efficacy is directly related to PEB, or efficacy moderates the relationship between attitudes and PEB.

Media Models. However, I begin with the secondary focus on media influences, that exposure to general news media and exposure to environmental media content are related to pro-environmental attitudes, while mediated civic activism is related to PEB. The relationships stated in H1a-c will be retained as controls across all forms of the general model, including subdimension models and (mis)match models.

H1a-b: Participants with higher levels of exposure to (a) general news media and (b) environmental media content will have higher levels of pro-environmental attitudes.

H1c: Participants who engage in more mediated civic activism behaviors will be more likely to perform pro-environmental behaviors.

General Model.

H2.0: Participants with stronger pro-environmental attitudes will be more likely to perform pro-environmental behaviors.

H3.0: Participants with greater environmental efficacy will be more likely to perform pro-environmental behaviors (i.e., a direct effect).

H4.0: The relationship between pro-environmental attitudes and PEB will be moderated by efficacy, such that the greater the efficacy, the stronger the relationship between attitudes and behaviors.

General Model with Subdimensions

Direct Effects with Subdimensions.

H2a: Participants with stronger value-based environmental attitudes will be more likely to perform (a) private PEBs.

H2b: Participants with stronger value-based environmental attitudes will be more likely to perform (b) public PEBs.

H2c: Participants with stronger concern-based environmental attitudes will be more likely to perform (c) private PEBs.

H2d: Participants with stronger concern-based environmental attitudes will be more likely to perform (d) public PEBs.

H3a: Participants with greater self-efficacy will be more likely to perform (a) private PEBs.

H3b: Participants with greater self-efficacy will be more likely to perform (b) public PEBs.

H3c: Participants with greater collective efficacy will be more likely to perform (c) private PEBs.

H3d: Participants with greater collective efficacy will be more likely to perform (d) public PEBs.

Direct Effects with Subdimensions Moderated by Efficacy Subdimensions.

H4a: Self-efficacy positively moderates the **H2a** relationship, that participants with stronger value-based environmental attitudes will be more likely to perform (a) private PEBs.

H4b: Self-efficacy positively moderates the **H2b** relationship, that participants with stronger value-based environmental attitudes will be more likely to perform (b) public PEBs.

H4c: Self-efficacy positively moderates the **H2c** relationship, that participants with stronger concern-based environmental attitudes will be more likely to perform (c) private PEBs.

H4d: Self-efficacy positively moderates **H2d** relationship, that participants with stronger

concern-based environmental attitudes will be more likely to perform (d) public PEBs.

H4e: Collective efficacy positively moderates the **H2a** relationship, that participants with stronger value-based environmental attitudes will be more likely to perform (a) private PEBs.

H4f: Collective efficacy positively moderates the **H2b** relationship, that participants with stronger value-based environmental attitudes will be more likely to perform (b) public PEBs.

H4g: Collective efficacy positively moderates the **H2c** relationship, that participants with stronger concern-based environmental attitudes will be more likely to perform (c) private PEBs.

H4h: Collective efficacy positively moderates **H2d** relationship, that participants with stronger concern-based environmental attitudes will be more likely to perform (d) public PEBs.

(Mis)Match Models with Subdimensions

Further, H2, H3, and H4 can be tested for the more subtle direct effects and moderation effects by considering matches and mismatches of attitudes (value, concern), efficacy (self, collective), and PEB (private, public). As noted above, the media relationships stated in H1a-c will be used as general media controls and retained across each of the following submodels.

Matches and Mismatches, Direct Effect and Moderation

For direct effect matches and mismatches, the following hypotheses H5a–H5h are just eight specific combinations of H2a-d and H3a-d. For moderation effect matches and mismatches, I just refer to H4a-H4g. For both sets, two hypotheses represent matches, and six hypotheses represent mismatches. We would expect that matches should lead to more variance explained in PEB than the mismatches. For instance, in the direct effects set,

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because public PEBs rely on the cooperation of others, collective efficacy should explain more variance in public PEB than self-efficacy, while self-efficacy explain more variance in private PEB than collective efficacy.

Direct Effect Matches

H5a: Values-based environmental attitudes and self-efficacy are both positively related to private PEB. (H2a, H3a)

H5b: Concern-based environmental attitudes and collective efficacy are both positively related to public PEB. (H2d, H3d)

Direct Effect Mismatches

H5c: Values-based environmental attitudes and self-efficacy are both positively related to public PEB. (H2b, H3b)

H5d: Values-based environmental attitudes and collective efficacy are both positively related to private PEB. (H2a, H3c)

H5e: Values-based environmental attitudes and collective efficacy are both positively related to public PEB. (H2b, H3d)

H5f: Concern-based environmental attitudes and self-efficacy are both positively related to private PEB. (H2c, H3a)

H5g: Concern-based environmental attitudes and self-efficacy are both positively related to public PEB. (H2d, H3b)

H5h: Concern-based environmental attitudes and collective efficacy are both positively related to private PEB. (H2c, H3c)

H6: The two matched relationships (H5a, H4b) will explain more variance in PEB than the six mismatched relationships (H5c - H5f).

Moderation Effect Matches

H2-4 can also be tested for matches and mismatches of attitudes (value, concern), and PEB (private, public) across moderation effects of efficacy (self, collective). Table 2 summarizes the matched and mismatched moderation hypotheses.

H7: The moderation effects that involve matches (H4a and H4h) will explain more variance in PEB than the moderation effects that involve at least one mismatch (H4b - H4g).

-- Table 2 –

Research Questions

Concerning the differing emphases on and results from the role of efficacy in environmental attitude-behavior literature, I will compare results from the direct and moderating models.

General and Matching Models

RQ1: In what ways do the results from the direct and moderation models differ? Simply put, the question is whether there is a significant moderating/interaction effect over and above the two direct effects.

RQ2a: To what extent and in what ways do the matched direct effects models exhibit stronger relationships than the mismatched models?

RQ2b: To what extent and in what ways do the matched moderation models exhibit stronger relationships than the mismatched moderation models?

Media Model

Considering the differential effects of various media channels in influencing pro-environmental attitudes, I will examine the relationship between exposure to different media sources and pro-environmental attitudes, and the relationship between mediated civic

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activism and PEBs. First I consider the general model, and then the (mis)match models. As noted above, the relationships stated in H1a-c will be retained across all of the following submodels.

A literature review suggests that concern-based environmental attitudes are more likely to be impacted by media exposure than value-based environmental attitudes (see above). Furthermore, because activism behaviors often require collective organization to perform, mediated civic activism may be more relevant to public PEB than private PEB. Although the media variables will only be used as general measures throughout the other tests, these bivariate relationships will be examined as research questions, via correlations and regressions for RQ3a-d and via correlations for RQ3e-f. Note that while each of the following three pairs of RQ3 is really referring to one overall comparison each between the respective two dependent variables, I list these as a-b, c-d, and e-f to explicitly refer to the distinct variables being compared.

RQ3a-b: In what ways are general news media exposure differentially related to (a) value-based environment attitudes and (b) concern-based environmental attitudes?

RQ3c-d: In what ways are environmental media differentially related to (c) value-based environment attitudes and (d) concern-based environmental attitudes?

RQ3e-f: In what ways is mediated civic activism differentially related to (e) private sphere and (f) public sphere PEBs?

General and Matched Models by Country

Finally, I compare results across 12 countries. For parsimony, only the best general model and the best of the (mis)matched model(s) will be compared across countries.

RQ4a-b: In what ways do the results from the best of the (a) general direct effects or (b)

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general moderation effects models differ across countries?

RQ4c-d: In what ways do the results from the best of the (a) direct effects (mis)matching models or (d) moderation effect (mis)matching models differ across countries?

Method

Sample

The data consist of survey responses from 1,000 adults 18 years or older in each of 12 countries: United States, Mexico, Brazil, United Kingdom, South Africa, Kenya, China, South Korea, India, Australia, United Arab Emirates, and Indonesia, for a total sample size of $n=12,000$. The survey data were collected in January and February 2019 by Ipsos for the National Geographic Society. All surveys were conducted online, except for Kenya and India, which were obtained via computer-aided face-to-face interviews. For most countries, the sample is nationally representative, but for those with online surveys but low Internet use (Mexico, Brazil, South Africa, China, and Indonesia) the sample is representative of online users. However, age and gender quotas were applied to reflect census data, so the data are not weighted. Interviews were conducted in English, the native language, or English and multiple languages in South Africa, Kenya, and India.

Measures

I analyzed the variables and their measures as provided in the 2019 Ipsos/National Geographic Society survey; I do not have access to their research or literature justification for the specific items, except as noted. For each question that had multiple items, the items were randomized across participants.

For each of the measures below, unless otherwise noted, each participant's responses were standardized using a within-country z-score to allow for meaningful comparisons

between countries, and to remove clustering effects (with biased standardized errors).

Environmental Attitudes

Valuing Nature. The degree to which participants value nature was assessed through six items from the Moral Conviction Scale & Values Scale (Chan et al., 2016), including "Nature has its own value, independent of its value to people" and "Nature is important to me, to who I am as a person," with response options ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Current Environmental Concerns. Participants' current environmental concern was measured by asking participants to indicate their level of concern for eight global issues including "habitat loss" and "lack of clean drinking water," with response options ranging from 1 (*not at all concerned*) to 5 (*very concerned*).

Combined Environmental Attitudes. A measure of general environmental attitudes was created by taking the mean value of the valuing nature and current environmental concern scales. Cronbach's α for the 14-item combined scale is .89.

Efficacy

Self-Efficacy. Participants' level of self-efficacy was measured by asking participants to "Please rate how confident you are that YOU AS AN INDIVIDUAL can attain the following goals in the next 10 years," with four items including "protect habitats" and "save animals at risk of extinction," and response options ranging from 0 (*cannot do at all*), 50 (*moderately can do*), to 100 (*highly certain can do*).

Collective Efficacy. Participants' levels of perceived collective efficacy were measured by asking participants to "Please rate how confident you are that YOUR COUNTRY can collectively attain the following goals in the next 10 years," with the same

items and response scale used to measure self-efficacy.

Combined Efficacy. A measure of general efficacy was created by taking the mean of participants' scores on the self-efficacy and collective efficacy measures, and then standardizing that mean using within-country z-scores. Cronbach's α for the combined two items is .74.

Pro-environmental Behaviors

Participants were asked to indicate how frequently they personally engaged in six PEBs over the past 12 months, such as "recycle" or "use your own reusable shopping bags" with response options ranging from 1 (*never*) to 5 (*all the time*). One item did not demonstrate adequate reliability and was removed from the analysis. Cronbach's α for the combined five items is .71.

Private and Public PEBs. Individual items from the PEB measure will be assessed as to whether they indicate private or public PEBs, as defined above.

Media Variables

Participants' media exposure was assessed through two items, one focusing on general media use, and the other on learning about environmental issues. Since I am primarily treating these as communication control variables, I will only take the overall count for this measure; I will not analyze differences across media.

Exposure to General News Media. General news media exposure was measured through one item that asked participants, "on average, how many major news websites, print newspapers or news magazines do you read daily?" The possible responses were *0, 1, 2, 3,* or *4 or more.*

Exposure to Environmental Media Content. Participants indicated how they

typically learn about issues that affect the environment. They were instructed to select all that apply from a list of 14 items, including "print or online publications," "television shows or documentaries," and "Instagram." The possible response to each was 0 (*no*) or 1 (*yes*).

Mediated Civic Activism. Participants were asked, "in the past 12 months, have you participated in any of the activities listed below?" Six of the 19 given civic activism behaviors involved communication via media channels (e.g., "posted to an online forum or blog," "called into a live news broadcast); the count of these six behaviors comprised participants' mediated civic activism score.

Control Variables

I include the following relevant covariates.

Age. Participants' age was measured categorically, including the options 1 (*18-24*), 2 (*25-34*), 3 (*45-44*), 4 (*45-44*), and 5 (*55 or older*). This measure was not standardized.

Gender. This question offered choices of 1 (Male), 2 (Female), 3 (Other), and 4 (Prefer not to say). As less than .2% reported the last two, those were dropped from analyses, and gender was recoded as 0 (Male) and 1 (Female). This measure was not standardized.

Residential Location. To measure residential location, participants were asked to indicate whether they currently live in a 1 (*rural*), 2 (*suburban*), or 3 (*urban*) area. This measure was not standardized.

Socio-Economic Ladder. To assess participants' socioeconomic status, participants were asked to respond to question 2 adapted from the MacArthur Scale of Subjective Social Status (University of California, San Francisco, 2008; the site provides literature review and justification for the measure). This item included a picture of a 10-rung ladder ranging from 1 (*at bottom*) to 10 (*at top*) and stated, "The ladder below represents where people stand in

your country's society. At the top of the ladder are the people who are the best off, those who have the most money, most education, and best jobs. At the bottom are the people who are the worst off, those who have the least money, least education, worst jobs, or no job. Please select the rung that best represents where you think you stand on the ladder." Because this scale already indicates participants' responses relative to others in their country, this measure was not standardized.

Education. Participants' level of education was assessed by asking participants, "Which of the following comes closest to the last level of education you completed?" with various responses appropriate to the country. This measure was standardized.

Environmental Social Norms (Descriptive). Participants' perception of environmental social norms was assessed by asking, "What percentage of people do you think engage in environmentally friendly behaviors, such as buying recycled, organic, or biodegradable products or saving energy in your country?" and allowing participants to enter a percentage from 0 to 100. Because this scale already indicates participants' responses relative to others in their country, this measure was not standardized.

Analyses

Descriptives and Scale Validation

The results will first present descriptive statistics of the measures. Next, principal components and alpha reliability analyses will be reported to verify the validity and reliability of the general scales and their distinct components.

Bivariate Analyses

Appropriate correlations among all the general and distinct measures were conducted. Associations (correlations and regressions) between individual news media and

environmental media with environmental attitudes, and between mediated civic activism and PEBs, are reported relevant to RQ3a-f.

Multivariate Analyses

Combining across all countries. For both the general model, and the (mis)match models, a hierarchical regression model, and products of mean-centered attitudes and efficacy, were used to test for significance of the moderation effects over and above the direct effects. To test and control for country differences, and avoid non-robust cluster errors, regression analyses use dummy codes for countries (with US as reference 0).

Within-Country Analyses. Descriptive statistics and mean difference tests for each country are provided below. Within-country tests of the hypotheses were conducted using the same hierarchical regression model, but without country dummy codes.

Effect Sizes

An understanding of effect size is necessary to consider the practical implications of these results. In this study, I report Pearson's correlation coefficients (r) for bivariate correlations and standardized beta coefficients (β) for individual variables in the models. Following Gignac and Szodorai's (2016) quantitative reevaluation of Cohen's (1988) guidelines, I consider $r = .11$ a small effect, $r = .19$ a medium effect, and $r = .29$ a large effect. For β, I consider .00 a null effect, .14 a small effect, .39 a medium effect, and .59 a large effect (Fairchild et al., 2009).

Results Overall

Descriptive Statistics

Table 3 presents descriptive statistics overall and for each country, for both subdimensions and combined scales.

--- Table 3 ---

As stated above, these analyses were conducted on secondary data collected in the 2019 Ipsos/National Geographic Society survey; I do not have access to their research or literature justification for the specific items, except as noted. Instead, current conceptualizations in the literature on environmental media, pro-environmental attitudes, efficacy, and pro-environmental behavior informed the focus on specific subdimensions and analysis approach.

To assess the reliability of the model variables, principal component analyses were performed on all variables (and their subdimensions) that were assessed through two or more items. Tables 4A-F present the factor structures of each variable that were determined to best reflect the underlying constructs. Two variables, exposure to environmental media content and mediated civic activism, required dichotomous yes/no responses, and were therefore created by summing the number of items participants indicated they had performed. Because these are count variables, they are not considered to be factors of an underlying concept. However, the principal component analyses of these items are reported in Tables 4A and 4B for consistency.

-- Table 4 A-F --

As expected, *pro-environmental attitudes* loaded onto two factors: environmental concern and valuing nature. After removing items with low factor loading, the two subdimensions created a general pro-environmental attitudes scale with good reliability, Cronbach's α = .89.

Similarly, the two dimensions of *efficacy*, self-efficacy and collective efficacy, loaded onto two factors, but could be combined into a general efficacy scale with good reliability,

Cronbach's α = .90. Because of the good reliabilities and factor loadings for both the

subdimensions and their general scales, I proceeded with all general and (mis)matching

analyses of pro-environmental attitudes and efficacy.

The principal component analysis of *pro-environmental behaviors* demonstrated that

three of five PEBs loaded onto one factor (public), while the remaining two loaded onto a

second factor (private). One item did not fit into either component and was therefore dropped

from subsequent analyses. The combined PEB scale and the public PEB scale both had

acceptable reliabilities (Cronbach's α = .71 and .75, respectively), but the two-item private

PEB scale was low (Cronbach's α = .58). Although some scholars argue that a split-half

reliability estimate is more appropriate when determining the reliability of two-item

measures (Eisinga et al., 2013), the Spearman-Brown correlation coefficient of the two

private PEB items was also ρ = .58 However, a lower alpha for instruments designed to

measure multifaceted constructs is often expected, especially when limited to a low number

of question items (Taber, 2018). Because of this relationship, Taber (2018) argues that more

focus should be placed on the interpretation of measures of multifaceted constructs, such as

PEB, which can still be highly useful with a low alpha. Therefore, PEB was also included in

all of the hypothesized general and (mis)match models.

Finally, as stated above, two of the three *media variables* were counts rather than

mean scales, and their low Cronbach's α's are expected given the limitations of dichotomous

items[1]. The third media variable, exposure to general news media, was assessed through a

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[1] Exposure to environmental media content was conceptualized as one factor for this thesis, as no differences between types of media content were hypothesized. However, a principal component analysis demonstrated that exposure to environmental media content could be conceptualized as two components: social media and traditional media. Because a two-factor solution explains 17.30% more variance than a one-factor solution, the combined exposure to environmental media content variable will not be as highly correlated with pro-environmental attitudes as either would be separately.

single item and therefore cannot be analyzed for reliability.

Bivariate Correlations

General Model with Single Dimensions

Bivariate Pearson correlations between all model variables and their subdimensions are presented in Table 5. As expected, and in support of H2.0, participants with stronger general pro-environmental attitudes were significantly more likely to perform general PEBs ($r = .439$, $p < .001$). Additionally, in support of H3.0, participants with greater environmental efficacy were significantly more likely to perform general pro-environmental behaviors (i.e., a direct effect; $r = .235$, $p < .001$).

-- Table 5 --

Both types of media exposure (general news and environmental content) were significantly and positively related to pro-environmental attitudes (supporting H1a-b), though the relationship between exposure to environmental media content and pro-environmental attitudes ($r = .282$, $p < .001$) was larger than the relationship between exposure to general news media and pro-environmental attitudes ($r = .184$, $p < .001$). In support of H1c, participants who engaged in more mediated civic activism behaviors were significantly more likely to perform pro-environmental behaviors ($r = .180$, $p < .001$).

To confirm results of the bivariate correlations while controlling for shared variance and demographics, more rigorous testing of the media variables was done using hierarchical regressions. These β weights controlling for the effects of demographics are presented in Table 6. To further examine H1a-b, that participants with higher levels of exposure to (a) general news media and (b) environmental media content will have higher levels of pro-environmental attitudes, general news media and environmental media content were placed

in block 1 and demographics were placed in block 2. The amount of variance in pro-environmental attitudes explained by exposure to environmental media content ($\beta = .257$, $p < .001$) was more than twice as high as the variance explained by exposure to general news media ($\beta = .121$, $p < .001$). Together, exposure to general news media and exposure to environmental media content explained 9.1% of the variance in pro-environmental attitudes, while demographics contributed another 1.8% Thus, H1a-b were supported.

-- Table 6 --

When the subdimensions of exposure to environmental content (traditional and social media) were analyzed separately for their effects on pro-environmental attitudes, the results were similar to those using the combined exposure to environmental media content variable. Exposure to general news media explained significant unique variance in pro-environmental attitudes ($\beta = .116$, $p < .001$). Exposure to environmental media content through traditional channels explained more unique variance in pro-environmental attitudes ($\beta = .230$, $p < .001$) than did exposure to environmental media content through social media channels ($\beta = .081$, $p < .001$); this result is surprising given the comparatively greater number of items included in the exposure to environmental media content through social media channels scale (5 vs. 2). Together, general news media, exposure to environmental media content through traditional media, and exposure to environmental media content through social media, explained 9.3% of the variance in pro-environmental attitudes, while demographics contributed another 1.7%.

Finally, to examine the effect of mediated civic activism on PEB while controlling for demographics, mediated civic activism was placed in block 1 and demographics were placed in block 2. Mediated civic activism explained significant unique variance in PEB ($\beta = .150$, p

< .001) but the block itself only explained 3.2% of the variance. The demographic variables explained another 7.4% of the variance in PEB, for a combined total of 10.6%. Thus, H1c was supported.

General Model with Subdimensions

Subdimensions of the main model variables were also examined for direct effects. Participants with stronger value-based environmental attitudes were significantly more likely to perform private PEBs ($r = .245$, $p < .001$; supporting H2a) and public PEBs ($r = .386$, $p < .001$; supporting H2b). Participants with stronger concern-based environmental attitudes were also significantly more likely to perform private PEBs ($r = .243$, $p < .001$; supporting H2c) and public PEBs ($r = .363$, $p < .001$; supporting H2d).

The efficacy subdimensions also shared significant, though weaker, relationships with private and public PEB; participants with greater self-efficacy were more likely to perform private PEBs ($r = .125$, $p < .001$; supporting H3a) and public PEBs ($r = .299$, $p < .001$; supporting H3b). Participants with greater collective efficacy were more likely to perform private PEBs ($r = .079$, $p < .001$; supporting H3c) and public PEBs ($r = .133$, $p < .001$; supporting H3d). For both subdimensions of efficacy, the relationship with public PEBs was stronger than the relationship with private PEB.

Media Model

The relationship between general news media exposure and value-based environmental attitudes ($r = .185$, $p < .001$) was slightly larger than the relationship between general news media exposure and concern-based environmental attitudes ($r = .149$, $p < .001$); however, both relationships were small overall (addressing RQ3a-b). The relationship between environmental media exposure and value-based environmental attitudes ($r = .243$, p

< .001) was also close in magnitude to the relationship between general news media exposure and concern-based environmental attitudes (addressing RQ3c-d; $r = .260$, $p < .001$). Still, these relationships were slightly larger than those with general news media exposure. Finally, the relationship between mediated civic activism and public PEB ($r = .198$, $p < .001$) was larger than the relationship between mediated civic activism and private PEB (addressing RQ3e-f; $r = .070$, $p < .001$).

Hierarchical Regressions of Full Models

To explore the variance explained by each set of variables in the order they appear in the hierarchical blocks of the model, and to avoid non-robust cluster errors, I use hierarchical multiple regressions to test both general and (mis)matching models on the overall sample. The country variable was dummy coded with the United States as the referent group. Dummy-coded country variables were then placed in block 1, relevant efficacy and attitude variables along with their centered interaction term were placed in block 2, exposure to general news media and exposure to mediated environmental content were placed in block 3, mediated civic activism was placed in block 4, and age, gender, location, SES ladder, education, and environmental social norms (descriptive) were placed in block 5. These steps allowed me to examine the predictive power of the central model variables (attitudes and efficacy) on PEB before indicating the additional variance explained by each subsequent set of controls.[2]

General Model, Overall

Table 7 presents results from the general model and eight (mis)matching models. All

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[2] An exploratory analysis on the combined, general model, that first removed the effects of demographics before examining the significance of the main model variables, was run for comparison. All standardized betas and significance values remained the same.

models were significant at $p < .001$. The general model, using the combined variables for attitudes, efficacy, and PEB, explained 34.5% of the variance in PEB. Although country factors only explained 6% of the variance, this represents approximately 17% of the total explained variance in the model (6% of 34.5%). Additional analyses into country differences are presented below. Both environmental attitudes and efficacy were significant (supporting H2.0 and H3.0, respectively), although the interaction of EA and efficacy was not (rejecting H4.0, and addressing RQ1); together, environmental attitudes and efficacy explained 21% of the variance in the general model. Exposure to news media and environmental media content were both significant and together explained an additional 3.7% of the variance. Although mediated civic activism was significant, it only explained .8% more variance in the model. Finally, age, gender, SES ladder, and environmental social norms (descriptive) were all significant, while residential location and education were not. Together, the demographics explained 3.2% of the variance in PEB.

-- Table 7 --

(Mis)matching Models, Overall

Although the general model explains a reasonable amount of variance in individuals' performance of PEBs, tests of (mis)match models highlight substantial differences that arise between subdimensions of pro-environmental attitudes, efficacy, and PEBs, addressing RQ2a-b. Across all matching and mismatching models, self-efficacy was higher than collective efficacy. In addition, tests involving *private PEB* as the outcome variable show noteworthy trends: (a) less overall variance explained (maximum 25.3%, for the matching model, and minimum 24.4%, for mismatch 6), (b) weaker effects of environmental attitude variables (valuing nature or environmental concern), (c) weaker effects of all three media

variables, (d) stronger effects of age, (e) slightly stronger effects of gender, (f) stronger, positive effects of residential location, and (g) weaker effects of SES ladder than matching and mismatching models involving *public PEB* as the outcome variable.

Although the lower variance explained when testing private PEBs was not anticipated, there are four probable explanations for this pattern of results. First, with only two behavior items to capture engagement in private PEBs, these data do not represent the range of possible private PEBs that individuals in the sample may have performed. Secondly, and related to the limited number of items, the low reliability of the private PEB items makes this variable less likely to capture substantial variance in the models. Finally, because environmental issues are inherently collective problems that require collective solutions, it is possible that these behaviors done in isolation are impacted by individuals' pro-environmental attitudes and efficacy to a lesser extent than behaviors that require collaboration.

The role of efficacy as a moderator varied throughout the (mis)match models. In total, efficacy was a significant moderator of the attitude-behavior relationship in five of the eight (mis)match models. Unexpectedly, however, efficacy (whether self-, collective, or combined) *negatively* moderated the attitude-behavior relationship, such that the greater the efficacy, the *weaker* the relationships. Self-efficacy significantly negatively moderated the relationship between value-based environmental attitudes and public PEBs, and between concern-based environmental attitudes and public PEBs. Collective efficacy significantly negatively moderated the relationship between value-based environmental attitudes and private PEBs, and between concern-based environmental attitudes and private PEBs, and between concern-based environmental attitudes and public PEBs. Because of the negative relationships, and

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varied lack of significance, H4a-h were rejected.

Although moderation was not significant in the general model, it appears that efficacy negatively moderates the attitude-behavior relationship in subtle forms, such as when testing for subdimensions of the general model variables and isolating specific country samples. Although the negative moderation was unanticipated, this may be due to the domain associated with the efficacy items. To measure efficacy, participants were asked how likely they as an individual, or their country, were to attain broad goals such as "protect habitats" and "reduce plastic pollution in our oceans." It is possible that people who hold strong pro-environmental attitudes and feel more efficacious at accomplishing broader environmental goals feel less inclined to put their energy towards smaller-scale pro-environmental behaviors, such as recycling or using reusable shopping bags.

When analyzed with the entire combined (cross-country) sample, the subdimensions of pro-environmental attitudes and the subdimensions of efficacy were significant across all of the (mis)match models, supporting H5a-h.

The model that explained the greatest amount of variance was, unexpectedly, the mismatch model between environmental concern, self-efficacy, and public ($R^2 = .374$), followed closely by the mismatch model between valuing nature, self-efficacy, and public PEB ($R^2 = .373$). Although I expected the two matching models to explain more variance than the mismatch models, the stronger results for these two models aligns with the findings that public PEB models have higher R^2 values than private PEB models, and that self-efficacy has higher β than collective efficacy. For both of these models, the interaction term between the environmental attitude variable (environmental concern and valuing nature, respectively) and self-efficacy was significant ($p < .05$, $p < .01$) and negative, though very

small. Thus, H6 and H7 were rejected.

In total, the interaction term between the respective environmental attitude and efficacy variables was negative and significant, but small, in five of the nine models, addressing RQ1.

Exploratory Models, Overall

Because the above results indicate that both subdimensions of environmental attitude (valuing nature and environmental concern) are strong predictors of PEBs, four additional exploratory models were analyzed in which environmental attitudes were considered as a single factor and paired with the subdimensions of efficacy and PEBs. As can be seen in Table 8, the combined, single factor, environmental attitudes variable resulted in the greatest amount of explained variance. The two strongest models include combined environmental attitudes, self-efficacy, and public PEB (R^2 = .392), and combined environmental attitudes, collective efficacy, and public PEB (R^2 = .380). Both models were significant at *p* < .001.

-- Table 8 --

Results by Country

Model Results

To address RQ4a-b and RQ4c-d, hierarchical regressions were computed for each country for both the general model and for the best fit model (environmental concern, self-efficacy, and public PEB). A visual comparison of both models (presented in Tables 9 and 10) demonstrates that, for all countries besides Indonesia and Kenya, the general model explains more variance in PEB than the one mismatch model. Furthermore, pro-environmental attitudes explain more unique variance in PEB in the general model. Still, some model variables explain more unique variance in PEB in the mismatch model: (a) self-

efficacy explains more variance in PEB in the mismatch model than combined (self- and collective) efficacy in the general model, (b) exposure to environmental media content explains more variance in the mismatch model for every country besides China, and (c) mediated civic activism explains more variance in the mismatch model for every country besides Indonesia. Because of the comparatively stronger fit of the general model, the following results by country will be described only for the general model.

-- Table 9, Table 10 --

Considering Countries' Press Freedom Scores

Table 11 presents the press freedom scores and statuses for each of the 12 countries included in the analyses. As summarized above, press freedom, "the ability to formally gather and disseminate knowledge, creative expression, and ideas," can vary substantially from one country to the next (Martin et al., 2016, p. 95). The Freedom House measure assigns each country a total press freedom score from zero (best) to 100 (worst), according to data on the countries' legal, political, and economic systems (Martin et al., 2016). Barriers to newsgathering, publication, broadcasting, and speech, are felt disproportionately by individuals residing in countries with high (vs. low) press freedom ratings. Although I expected measures of press freedom to provide informative insights on some of the variability in the cross-country comparisons, the press freedom scores did not elucidate which countries best fit the general model, demonstrated stronger effects of media exposure (either general news or environmental content), or impacted the central model variables.

The lack of insight provided by the measure of press freedom may be due to a variety of factors. First, the structure of the media in terms of press freedom may not play a large role in individuals' performance of PEB. There may be other country differences that matter

to a greater extent than press freedom; as mentioned in The Importance of a Global Perspective section, other cultural, social, and political contexts such as general collectivist and individualist values may affect people's understanding of their personal role in environmental degradation (Chwialkowska et al., 2020). However, only 6% of the variance in PEB is explained by countries. Consequently, any differences that exist across countries, whether press freedom, individualism/collectivism, or other differences, do not play a large role in individuals' performance of PEBs.

-- Table 11 --

Country Comparisons

All country comparisons are based on visual inspection of the models. This section does not test or claim significant differences between countries, or between individual country samples and the combined sample.

United States

The data from the United States (R^2 = .410) fit the general model better than the combined data (R^2 = .345). For the most part, the pattern of results across model variables was similar when examined using the US sample and the combined (cross-country) sample, though slightly larger relationships emerged between model variables and PEB when examined using the US sample. However, while age explained significant (and positive) variance in PEB when analyzed using the combined sample, this variable did not reach significance when using only US participants. That this variable did not reach significance in the US sample is not surprising, as the standardized β was very low for the overall model (β = .029), and the sample size was reduced by 1/12 when isolating the US. Conversely, education was not significant in the overall sample, but did reach significance in the US

sample at $p < .05$. In the US sample, environmental social norms explained the greatest amount of variance in PEB out of all 12 countries analyzed. The United States is considered "free" by Freedom House metrics.

Mexico

The Mexico data ($R^2 = .272$) had a lower model fit than the combined data ($R^2 = .345$). In contrast to the results obtained when using the combined sample, the unique variance explained by pro-environmental attitudes in the Mexico sample was lower, and unique variance explained by efficacy was higher. Indeed, out of the 12 countries analyzed, efficacy explained the greatest amount of unique variance in PEB in the Mexico sample. Age was not significant in the Mexico sample. Although gender explained almost twice the amount of variance in PEB in the Mexico-only sample than the combined sample, and explained the greatest amount of variance in PEB out of all countries analyzed, the standardized β was still quite small ($\beta = .107$, $p < .001$). Mexico is considered "not free" by Freedom House metrics.

Brazil

The Brazil data ($R^2 = .262$) had a lower model fit than the combined data ($R^2 = .345$). As reflected in the Mexico sample, when the general model was analyzed using the Brazil sample, pro-environmental attitudes explained less variance in PEB than when using the combined sample, and efficacy explained more variance in PEB. Exposure to general news media explained less variance in PEB in the Brazil sample than it did in the combined sample, while exposure to environmental media content explained more variance in PEB in the Brazil sample than it did in the combined sample. The amount of variance explained by each of the demographics, besides social norms, differed between the Brazil sample and the

combined sample. The amount of variance explained by age in the Brazil sample was more than four times that explained by the combined sample. In contrast to the general model, gender and the SES ladder were not significant in the Brazil sample; the SES ladder explained the least amount of variance in PEB out of all the countries analyzed. Residential location and education were both significant at $p < .05$. Brazil is considered "partially free" by Freedom House metrics.

United Kingdom

The United Kingdom data ($R^2 = .420$) had a higher model fit than the combined data ($R^2 = .345$). In contrast to the combined sample, exposure to general news media was not significant in the United Kingdom sample, while exposure to environmental media content explained more variability in PEB ($\beta = .163$, $p < .001$) than in the combined sample ($\beta = .110$, $p < .001$). Indeed, exposure to general news media explained the least amount of variance in PEB out of all countries analyzed, while exposure to environmental media content explained the greatest amount of variance in PEB out of all countries analyzed. Age was not significant. The amount of variance explained by environmental social norms was lowest in the United Kingdom than in the other countries analyzed. The United Kingdom is considered "free" by Freedom House metrics.

South Africa

The South Africa data ($R^2 = .290$) had a lower model fit than the combined data ($R^2 = .345$). Similar to Mexico and Brazil, pro-environmental attitudes explained less unique variance in PEB using the South Africa sample than when using the combined sample, efficacy explained more unique variance in PEB than when using the combined sample. However, the interaction term between pro-environmental attitudes and efficacy was

significant at $p < .01$, and explained the greatest amount of variance in PEB of all the

countries analyzed. Exposure to general news media explained more variance in PEB than

when using the general sample and was highest of all the countries analyzed. South Africa is

considered "partially free" by Freedom House metrics.

Kenya

The data from Kenya had the poorest fit with the general model out of all the

countries analyzed, resulting in an overall model fit of $R^2 = .072$. Because of the low model

fit, many model variables were not significant, including efficacy, exposure to general news

media, and mediated civic activism, along with age, gender, and the SES ladder. Although

significant, pro-environmental attitudes explained the least amount of variance in PEB out of

all countries analyzed. However, residential location explained the greatest amount of

variance in PEB out of all countries analyzed ($\beta = .146$, $p < .001$), even with the low model

fit. Kenya is considered "partially free" by Freedom House metrics.

China

The China data ($R^2 = .378$) had a higher model fit than the combined data ($R^2 = .345$).

Efficacy was not significant in the China sample, but all media variables (exposure to general

news media, exposure to environmental content, and mediated civic activism) explained a

greater amount of variance in PEB in the China sample than in the combined sample. Age

was not significant, gender was significant but only at $p < .05$, and residential location was

significant at $p < .01$. The SES ladder explained the greatest amount of variance in PEB out

of all countries analyzed. China is considered "not free" by Freedom House metrics.

South Korea

The South Korea data ($R^2 = .368$) had a higher model fit than the combined data (R^2

= .345). In contrast to the combined sample, both types of media exposure (general news media and environmental media content) explained less variance in PEB. Age and gender were not significant, but residential location was (β = .090, p < .001), and environmental social norms explained only .1% less variance than in the United States sample. South Korea is considered "partially free" by Freedom House metrics.

India

The India data (R^2 = .373) had a higher model fit than the overall data (R^2 = .345). Pro-environmental attitudes explained more variance in PEB when examined with the India sample in contrast to the combined sample, while efficacy explained less. Mediated civic activism also explained less variance in the India sample than in the combined sample. Many of the demographics also explained more variance in the India sample than in the combined sample: age explained more variance than any of the other countries analyzed (β = .123, p < .001), the unique variance explained by residential location was negative and significant at p < .01, and the unique variance explained by education was negative and significant at p < .01. Conversely, gender was not significant in the India sample. India is considered "partially free" by Freedom House metrics.

Australia

The Australia data had the best model fit out of all countries analyzed (R^2 = .429). Although pro-environmental attitudes explained more variance when analyzed separately in the Australia sample than when using the combined sample, efficacy explained less. Similarly, exposure to environmental media content explained more variance while exposure to general news media explained less. Mediated civic activism explained more variance in the Australia sample than in all other countries analyzed (β = .128, p < .001). Age was not

significant, but residential location was negative and significant at $p < .05$. Australia is considered "partially free" by Freedom House metrics.

United Arab Emirates

The United Arab Emirates data ($R^2 = .407$) had a higher model fit than the combined data ($R^2 = .345$). Pro-environmental attitudes explained more variance in PEB than all other countries analyzed ($\beta = .532$, $p < .001$), while the variance explained by efficacy was not significant, and lowest of all countries analyzed. Exposure to environmental media content was not significant, and explained the least amount of variance in the model of all countries analyzed. Age and gender were not significant, but the SES ladder explained more variance in the UAE sample than in the combined sample. The UAE is considered "not free" by Freedom House metrics.

Indonesia

The Indonesia data ($R^2 = .311$) had a lower model fit than the combined data ($R^2 = .345$). In contrast to the combined sample, pro-environmental attitudes explained less variance while efficacy explained more. Both types of media exposure (general news media and environmental media content) explained more variance in the Indonesia sample than in the combined sample. Neither age nor gender were significant. Indonesia is considered "not free" by Freedom House metrics.

Model Variables across Countries

As above, this section does not test or claim significant differences between countries, or between individual country samples and the combined sample.

Pro-Environmental Attitudes

Pro-environmental attitudes was a significant predictor of PEB across all 12

countries. In comparison to the combined sample, pro-environmental attitudes explained more variance in PEB in the United States, the United Kingdom, South Korea, India, Australia, and the United Arab Emirates samples. In the Mexico, Brazil, South Africa, Kenya, China, and Indonesia samples, the unique variance explained by pro-environmental attitudes was less than that explained in the combined sample. Pro-environmental attitudes explained the greatest amount of unique variance in the United Arab Emirates sample, and the least amount of unique variance in the Kenya sample.

Efficacy

Efficacy explained significant unique variance in PEB in nine of the 12 countries. Only in Kenya, China, and the UAE did efficacy not explain significant unique variance in the general model. Although Kenya's results were weak throughout the entire model, the lack of significant findings in China and the UAE is surprising given the greater amount of variance explained by the samples overall. It is possible that their higher scores on the press freedom rankings contributed to individuals in China and the UAE perceiving that they had a diminished ability to alleviate environmental issues in general; however, the descriptive statistics for these two countries indicate that the participants in these countries had average to high efficacy ratings in comparison to the other 11 countries.

Media Exposure: General News and Environmental Content

Exposure to environmental media content predicted slightly more variance in PEB than did exposure to general news media in the combined sample; this pattern was shared by seven of the 12 country-level models. In Mexico, South Africa, India, the UAE, and Indonesia, exposure to general news media explained more variance in PEB than did exposure to environmental media content. Although both types of media exposure

significantly explained unique variance in PEB across most countries in the analysis, this finding was not universal. Exposure to general news media did not significantly explain unique variance in PEB in the United Kingdom or Kenya, though as stated previously, the Kenya model explained a limited amount of variance overall and many of the model variables did not reach significance. Although the low average general news exposure in the United Kingdom may have accounted for its lack of significance (see Table 1), participants in the United States were exposed to similar levels of general news media, though the unique variance explained by general news media in the US did reach significance. Exposure to environmental media content explained significant unique variance in every country besides the United Arab Emirates. Although participants in the UAE were exposed to more environmental media content, on average, than all other countries besides Indonesia, it is possible that the UAE's lack of press freedom resulted in greater censorship of environmental media content, thus limiting its ability to explain significant variance in PEB.

Mediated Civic Activism

Mediated civic activism explained limited variance in the combined sample, as well as across countries. Mediated civic activism explained the greatest amount of variance in Australia, while in Kenya, mediated civic activism explained the least amount of unique variance. Although limited, mediated civic activism explained significant unique variance in PEB in all countries besides Kenya, though significance was only achieved at the $p < .05$ level in the UAE.

Summary

A summary of the hypotheses and the above findings is presented in Table 12. The results for the general model provide support for the direct effect, but not moderation, model;

in total, 21 of the 32 hypotheses were supported by the analyses.

-- Table 12 --

In general, the above results provide support for a general model of pro-environmental attitudes, efficacy, and PEB. When applied across countries, the moderating role of efficacy was rejected, and even trended in a negative direction. Separating the sample into individual countries, however, indicated that the moderating role of efficacy may be more nuanced; in two of the 12 countries included in the analysis, the interaction between pro-environmental attitudes and efficacy reached significance.

Separating each of the central model variables (pro-environmental attitudes, efficacy, and PEB) into their subcomponents further highlights the complexities of these measures. Although I expected that subdimensions that were matched by domain would explain more variance in PEB, this pattern of results was not confirmed by the analyses. Instead, specific subdimensions appeared to play more important roles in explaining engagement in PEB; models that examined the effects of various subdimensions on *public* PEB explained consistently more variance in PEB than models that used *private* PEB as the outcome variable. Similarly, models with *self-efficacy* as a predictor variable tended to explain more variance in PEB than models with *collective efficacy* as a predictor (though the models with public PEB as the outcome variable were higher regardless). Both *Concern-based* environmental attitudes and *values-based* pro-environmental attitudes appeared to be good predictors of PEB. Because of these stronger subdimensions, the specific mismatch model with environmental concern, self-efficacy, and public PEB emerged as the strongest model overall, though it only explained 2.9% more variance in PEB than the general model in the combined cross-country sample.

Although these results highlight important differences across subdimensions and countries, the practical importance of these differences should be addressed. The variance explained in the mismatch models ranged from $R^2 = .244$ (environmental concern, collective efficacy, private PEB) to $R^2 = .374$ (environmental concern, self-efficacy, public PEB). Furthermore, tests of the general model across countries ranged from $R^2 = .072$ (Kenya) to $R^2 = .429$ (Australia). Thus there is considerable variation in results by model, and by country.

These results also highlight that, even when selecting the model and sample with the highest explanatory power, more than half of the variance in PEB is still left unexplained. Clearly, there are many other facets of PEB that determine whether individuals will engage in behaviors that align with their pro-environmental attitudes. Still, these models indicate that pro-environmental attitudes, whether combined, value-based, or concern-based, are important predictors of individuals' engagement in PEB across countries. In most countries, efficacy plays a significant role in PEB performance as well, though to a lesser extent than pro-environmental attitudes. Similarly, exposure to general news media, environmental media content, and mediated civic activism are generally predictive of individuals' engagement in PEB, though only the latter was hypothesized to have a direct effect on PEB, and even then primarily as a control. Furthermore, though the strength of these relationships varies across countries. Finally, the SES ladder and environmental social norms are nearly consistently related to PEB performance, though the effects of age, gender, location, and education vary substantially across countries.

Discussion

Summary

This thesis attempts to clarify the nuances in three central constructs in environmental

communication—pro-environmental attitudes, efficacy, and pro-environmental behavior—and to examine their application across 12 countries. As global environmental issues become increasingly pressing (IPCC, 2021), cross-country research is needed to clarify mixed findings in the literature, and to form a coherent understanding of the many subdimensions of these constructs and the relationships between them. Furthermore, because many individuals receive environmental information through the media (Dahlstrom, 2014; Hansen, 2011; National Science Board, 2018; Taddicken, 2013), this study highlights the role of media in individuals' enactment of PEBs. A discussion of the findings overall, and by country, is presented below.

Model Variables

Pro-Environmental Attitudes. As expected, pro-environmental attitudes were significantly associated with PEB in both the overall analyses and across individual countries. With the exception of the mismatch model tested in Kenya, pro-environmental attitudes explained more unique variance in PEB than any other variable across all models tested and all individual countries analyzed. In the general, overall, model, pro-environmental attitudes explained almost 40% of the variance in PEB, while some analyses, such as the general models in India and the United Arab Emirates, pro-environmental attitudes explained over 50% of unique variance in PEB. These findings are consistent with attitude-behavior theories such as the theory of planned behavior and the large body of EA literature indicating a small to moderate relationship between EA and PEB (Ajzen, 1991; Axelrod & Lehman, 1993; Bozorgparvar, 2018; Hines et al., 1987; Kim et al., 2013; Lee et al., 2014; Meinhold & Malkus, 2005; Oreg & Katz-Gerro, 2006; Wang, 2017).

Although the correlations between value-based pro-environmental attitudes and PEB

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(general, private, and public) were slightly larger than the correlations between concern-based environmental attitudes and PEB (general, private, and public), tests of all matching and mismatch models indicated that both subdimensions performed well as predictors of PEB. However, general pro-environmental attitudes, composed of both environmental concern and valuing nature, slightly outperformed both separate subdimensions, both in the bivariate correlations with PEB and its subdimensions, and in the hierarchical regressions. Indeed, exploratory models that used the subdimensions of efficacy and PEB, with the general measure of pro-environmental attitudes, indicate that considering pro-environmental attitudes as a single factor provides the strongest results.

The models suggest that when conducting cross-country research, a general measure of pro-environmental attitudes may provide more insight into individuals' engagement in PEB than either subdimension alone. These findings support Kaiser et al.'s (1999) argument that both environmental attitudes and behavior should be measured generally, because many specific influences and challenges to PEB vary across individuals and contexts.

Nevertheless, it is important to note that these findings do not contradict arguments for measuring attitudes at a high degree of specificity, such as those outlined in the TPB and earlier theory of reasoned action (TRA; Ajzen, 1991; Fishbein, 1979; see also Kim, 2011). Fishbein (1979) explains that, to have a high degree of correspondence between the attitude and behavior measures, the measurement of an attitude should relate to the exact behavioral item; for example, if behavior is measured by asking participants to indicate how frequently they use reusable shopping bags, the attitude measurement that provides the best behavioral prediction would specifically ask people about their attitudes towards their own use of reusable shopping bags. It would be inaccurate, therefore, to imply that these findings

demonstrate that the stronger results obtained through measuring general pro-environmental attitudes, as opposed to subdimensions of general pro-environmental attitudes, indicate that general measures of EA outperform measures of EA specific to individual behaviors. Still, in cross-country research, identifying PEB items and corresponding attitudes at the level of specificity required for the TRA and TPB that are relevant to individuals in drastically diverse contexts may not be feasible or even useful. Instead, opting for general measures of EA may be more appropriate when studying these more diverse samples.

Pro-Environmental Behavior. Although I expected models matched by domain to outperform mismatch models, the subdimensions of PEB (private and public) determined the model fit above any (mis)matching effects. Models that tested public PEB as the outcome variable had consistently higher R^2 values than models that tested private PEB. Furthermore, mismatch models with public PEB as the outcome variable had higher R^2 values than the general model tested on the combined sample. Three possible explanations for the strength of public PEB over private PEB were identified above; below, each of these explanations will be discussed in turn.

First, only two behavior items were used to capture engagement in private PEBs. Fishbein (1979) notes that "not only are one or two specific actions too small a sample to represent the general category, but more often than one would like, the particular action or actions selected may not be valid indicants of the intended category" (p. 74). In this study, the limited number of questions that addressed participants' engagement in private PEBs likely did not represent the range of possible private PEBs that individuals in the sample may have performed. This problem is exacerbated by this study's cross-country sample, in which diversity in contexts that either facilitate or impede participants' engagement in various PEBs

is expected. In countries that do not have reliable access to recycling services, or in which reusable shopping bags are carried out of necessity, these two items that were used to represent private PEBs may not have been truly indicative of this behavioral category.

Secondly, and related to the limited number of items, the low reliability of and correlation between private PEB items makes this variable less likely to capture substantial variance in the models. Although Taber (2018) argues that measures of multifaceted constructs, such as PEB, can still be highly useful with a low alpha, the low reliability of this measure may have impeded the ability to detect statistically meaningful relationships between private PEB and the other model variables.

Finally, many environmental issues are global in nature, and therefore inherently collective problems (Chen, 2015; Homburg & Stolberg, 2006; Reese & Junge, 2017). Without collective solutions, global environmental problems such as reducing plastic pollution and protecting species at risk of extinction are unlikely to result in meaningful change (Hamann & Reese, 2020; Jugert et al., 2016; Wang, 2018). Because environmental problems cannot be solved by individual behaviors alone (Hamann & Reese, 2020; Jugert et al., 2016; Wang, 2018), it is possible that private PEBs are impacted by individuals' pro-environmental attitudes and efficacy to a lesser extent than public PEBs, in which collective effort to achieve environmental goals is more salient. However, Tam and Chan (2017) conducted a multi-level model of private and public PEB across 32 countries and found that the partial correlation between environmental concern and public-sphere PEB was *weaker* than that between environmental concern and private-sphere PEB. Although Tam and Chan's measures of PEB were also limited (six items were used for private-sphere PEB and four for public-sphere PEB), the contradictory results suggest that further research is needed to

understand differential engagement in public- and private-sphere PEBs.

Beyond providing better model fits than private PEB, public PEB also had larger correlations with many of the other model variables than did the general measure of PEB. There are both methodological and conceptual explanations for these results.

Methodologically, the public PEB items represented much broader categories of behavior than the private PEB items. Public PEB items included "Avoid products with ingredients that are bad for the environment," "Talk to friends or family about an environmental issue," and "Used social media to share information about an environmental issue." Many different actions fall under these broad behavioral questions, allowing participants in diverse contexts to all respond affirmatively to these items. In contrast, the two private sphere PEB items ("Recycle" and "Use your own reusable shopping bag") are very specific and can be heavily constrained by contextual factors such as availability of infrastructure. Including these two more constricted items in the combined PEB scale may have diminished its reliability and relationship with other variables, as reflected by the slightly lower Cronbach's α.

Interestingly, for all three measures of pro-environmental attitudes (general, value, and concern), the correlations were larger with the combined PEB scale than with the public PEB subdimension alone. As stated above, extant research suggests that the measurement of pro-environmental attitudes and PEB should be matched by domain: both can be measured at a very high level of specificity (as outlined in the TRA and TPB; Ajzen, 1991; Fishbein, 1979), or both can be measured generally to account for varying contexts and influences (e.g., Kaiser et al., 1999). Because all three measures of pro-environmental attitudes were more general than the specific PEB items, it is possible that combing both public and private

PEBs into the more general measure of PEB better corresponded to the more general measures of pro-environmental attitudes (e.g., Kaiser et al., 1999).

Efficacy. Efficacy, and its subdimensions, were also consistently related to PEB across models and countries. However, the specific direct relationships between efficacy and PEB were much smaller than those between pro-environmental attitudes and PEB. In the general, overall model, efficacy explained 9.5% of unique variance in PEB, while efficacy explained up to 16.9% of unique variance in the general model tested on individual countries (this highest percent was for Mexico). In the general model, efficacy was significant in nine of the 12 individual countries, though it did not explain significant unique variance in the Kenya, China, and UAE samples.

There are several potential explanations for the weak effects of efficacy obtained in this study. First, it may be that overall efficacy on its own does not matter much. Rather, it is largely encompassed by EA and explains unique variance only in combination with the attitude effect. For example, in general, a person might feel they can accomplish something, but that is not going to affect their behavior unless they have a positive attitude toward engaging in that behavior. Although the present study cannot isolate causal effects (or the lack thereof), this particular theoretical explanation of the findings would constitute a note of caution to researchers and public-facing communicators who assume that efficacy is a primary influential lever in motivating behavior.

Another explanation could be the way this specific study measured efficacy. The measure referred to global environmental issues and long-term (10 years) outcomes rather than to one's ability to complete a specific type of PEB in one's daily life. It is likely that individuals' sense of efficacy in their ability to perform a small-scale, short-term pro-

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environmental task such as recycling in the coming week would have a stronger relationship

with their eventual engagement in that behavior, but their belief about their ability to help

solve global environmental issues (as phrased in the measures of both self- and collective

efficacy in this study) would play a smaller role in their everyday decisions to behave as

responsible stewards of the planet. (Encouraging individuals to consider and respond to this

long-term nature of environmental impacts is of course one of the central challenges in both

policy decisions and environmental communication campaigns, as noted earlier.) Indeed, the

items used to measure efficacy in this study may better represent the concept of

environmental hubris, in which individuals believe in "big-ticket silver bullet solutions" to a

systemic problem accompanied by "a proud assertion that we can vanquish it" (Niemann,

2017, p. 250; 254). As such, a mismatch in the scale, scope, or conceptualization of efficacy

and behavior could influence the strength of the efficacy-behavior relationship. This idea

certainly merits further investigation.

Another possible explanation for the limited direct effect of efficacy on PEB would

be that EA and efficacy are highly correlated, so that the presence of EA in the model

removes much of the effect of efficacy. However, efficacy and its subdimensions are in fact

weakly correlated with EA and its subdimensions ($r = .091$ to $r = .249$), as well as with PEB

and its subdimensions ($r = .079$ to $r = .299$), while EA and its subdimensions have stronger

relationships with PEB ($r = .243$ to $r = .439$).

Although explanations exist for the weaker effects of efficacy in this study, these

results are surprising given the strong theoretical justification and prior evidence for the role

of efficacy in predicting engagement in PEB. Scholars often place emphasis on efficacy's

role in allowing individuals to translate attitudes into action (e.g., McDonald, 2014), because

without the belief that a goal is attainable and impactful, it is difficult to anticipate how individuals would be motivated to extend effort towards that behavior. However, the overall results of these analyses suggest that a sense of efficacy surrounding the mitigation of environmental issues may not be as central to or salient for individuals' performance of PEB as their pro-environmental attitudes. Rather, pro-environmental attitudes seem to be the primary explanatory variable for PEB.

That efficacy explained less unique variance in the models than pro-environmental attitudes is also surprising given previous cross-country research demonstrating stronger effects of efficacy on PEB and PEB intentions than pro-environmental attitudes (e.g., Kim et al., 2013; Wang, 2017). Unfortunately, different measurements of pro-environmental attitudes obscure meaningful comparisons between these studies, and between the above results and these studies. Kim et al. (2013) used a measure of "prevention attitude" in their model, while Wang (2017) used a one-item measure of environmental concern. Conversely, in a meta-analysis of 66 articles from 28 countries, Morren and Grinstein (2016) found that the relationship between environmental concern and PEB was *stronger* than the relationship between perceived behavioral control and PEB. Although findings from this study suggest that pro-environmental attitudes play a larger role in individuals' performance of PEB than does efficacy, further research is needed to clarify the relative strength of these relationships.

In contrast to the measurement of pro-environmental attitudes, the subdimensions of efficacy did differ in their predictive power. Visual inspection indicated that self-efficacy was more strongly correlated with PEB and its subdimensions than was collective efficacy and explained more unique variance in every (mis)match model. Because of its higher predictive power, models using self-efficacy often had higher R^2 values than those using

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collective efficacy, though this effect was secondary to the effect of public vs. private PEB. In addition, across each of the 12 countries, self-efficacy was also correlated more strongly with PEB and its subdimensions than was the combined measure of efficacy and explained more unique variance in PEB than did combined efficacy. In the mismatch model testing environmental concern, self-efficacy, and public PEB, self-efficacy was significant in every country, explaining a maximum of 19.9% of unique variance in PEB.

The stronger effects of self-efficacy compared to collective efficacy on PEB suggest that the belief that one, personally, is capable of performing actions to achieve a goal is a stronger motivator of individual action than is the belief that one's group can make a difference. These findings support previous research that indicates that collective efficacy could eventually lead to inaction because a single member's behavior may then seem unnecessary or insubstantial for goal achievement (Olson, 1965), and that individual self-efficacy may be somewhat necessary for perceived collective efficacy to influence individual behavior intentions, especially in large-scale environmental contexts (Jugert et al., 2016).

Moderation

The moderation analyses revealed very few significant interactions between efficacy and pro-environmental attitudes, with very weak effects overall. Notably, the reported interactions were in the opposite direction than was hypothesized: efficacy (whether self-, collective, or combined) *negatively* moderated the attitude-behavior relationship, such that the greater the efficacy, the *weaker* the relationships.

Although the negative moderation was certainly unanticipated, these results may again reflect the broad domain associated with the efficacy items used in this study. It is possible that a sense of efficacy to accomplish broader and more influential environmental

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goals such as "protect habitats" and "reduce plastic pollution in our oceans" actually undermines people's drive to engage in the smaller-scale PEBs measured in this study. If this is the case, then people who hold strong pro-environmental attitudes and feel more efficacious at accomplishing broader environmental goals may feel less inclined to put their energy towards smaller-scale pro-environmental behaviors, such as recycling or using reusable shopping bags. Future research is needed to explore this possibility.

Media Variables

As anticipated, both types of media exposure—general news and environmental content—were significantly positively correlated with pro-environmental attitudes and its subdimensions. Additionally, mediated civic activism was significantly positively correlated with PEB and its subdimensions.

Unexpectedly, the two types of media exposure (general news and environmental content) were more strongly directly correlated with PEB than directly with pro-environmental attitudes. Although the above literature review indicated that media exposure could affect all three model variables (pro-environmental attitudes, efficacy, and PEB), stronger correlations with EA were expected due to the media's direct ability to shape people's awareness of, and concern for, environmental issues. Instead, these findings suggest that media exposure has a stronger effect on people's engagement in PEBs, especially in the public sphere.

Again, the specific items used to measure public PEB likely played a role in these unexpected results. Two of the three public PEB items entailed communicating with one's social network about an environmental issue. One of these items specifically measured participants' use of social media platforms to share information about an environmental

issue, while the other item asked participants to indicate how often they "talk to friends or family about an environmental issue" without specifying whether this conversation was mediated. It is quite reasonable to suspect that individuals would share mediated information, whether general or environmental, through these channels. Because actions such as reposting environmental content or talking with friends and family about environmental issues can be done easily and in many diverse contexts, individuals may have been able to engage in these actions without impacting their pro-environmental attitudes. However, an exploratory analysis separating environmental media exposure into traditional and social media channels indicated that exposure to environmental content through traditional channels explained more unique variance in PEB than exposure to environmental content through social media. As stated above, participants' sharing of information about an environmental issue through social media platforms, specifically, was included as an indicator of PEB. If sharing environmental content through social media was simply an automatic response to viewing media content in the same channels, we would expect to see an opposite pattern, with exposure to environmental content through social media channels explaining more unique variance in PEB than exposure to environmental content through traditional channels. More research is needed to understand these more subtle influences of media exposure on PEB.

Finally, although I only predicted direct effects of exposure to general news media and environmental content on attitudes (H1a, H1b), bivariate correlations between model variables revealed that exposure to environmental mediated content had larger correlations with all other model variables and their subdimensions than did exposure to general news media (see Table 5). It is interesting to note that, despite these larger correlations, exposure to environmental mediated content did not consistently explain more unique variance in PEB

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than did general news media. For example, in Mexico, exposure to general news media explained 15.3% of unique variance in PEB, while exposure to environmental media content explained only 9.3% of unique variance in PEB. These results suggest that exposure to environmental media content, specifically, is important in determining individuals' environmental attitudes and behaviors, likely through agenda-setting and media framing effects (e.g., Klinger & Metag, 2021), but that exposure to general news media is also relevant.

Demographics

Although, together, the demographics explained between 2.2% to 8.3% of unique variance in PEB, only descriptive environmental social norms and one's perceived relative position on the socioeconomic ladder explained significant unique variance across nearly all models and countries. These findings suggest that, regardless of the subdimensions used in the analyses, or country in which the behaviors are performed, both the perception of others' engagement in environmentally friendly behaviors, and one's own standing in their country's society, impacts engagement in PEBs. Specifically, the more individuals perceive that others engage in PEBs, the more likely they are to perform PEBs themselves, and in all models besides the general models in Brazil, Kenya, and South Korea, the higher individuals' relative SES, the less likely they are to engage in PEBs.

Age, location, and education had a significant association with PEB in only some countries. Further, there is some variation in the sign of the explanatory variable's coefficient across countries. This suggests that the role of these variables in understanding PEB may be country-dependent, so that policies or communication efforts concerning EA, environmental efficacy, or PEB should be tailored accordingly.

Country-Level Differences

When examining the overall sample, tests of general and (mis)match models demonstrate that country-level differences explain little unique variance in PEB. In the general model, country variables explained only 5.9% of the variance in general PEB. In models examining private PEB as the outcome variable, country-level differences explained 12.1% of the variance in PEB, and in models examining public PEB as the outcome variable, country-level differences explained 14.0% of the variance in PEB. These findings indicate that individuals' pro-environmental attitudes play a larger role in their performance of PEB than their country of residence, even after controlling for country-level effects. Similarly, general efficacy and self-efficacy, media exposure, perceived position on the SES ladder, and descriptive environmental social norms are just as, or more, important in individuals' enactment of PEB as country-level influences. The theoretical and practical implications of these findings are discussed in the relevant sections below.

When considered separately by country, the results indicate that the fit of the model to individual country samples varies substantially. The general model explained over 40% of variance in PEB in the United States, the United Kingdom, Australia, and the United Arab Emirates, while it explained less than 30% of the variance in PEB in Mexico, Brazil, and South Africa. In Kenya, the general model only explained 7.2% of the variance in PEB.

An examination of press freedom measures alongside country-level analyses did not elucidate which countries best fit the general model, demonstrated stronger effects of media exposure (either general news or environmental content), or impacted the central model variables. However, extant research examining country differences in PEB sheds light on other potential reasons for this country-level variation. Previous research demonstrates that

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not only is "the likelihood of intentions turning into actual pro-environmental behavior higher in developed countries than in developing countries" (Bilandzic & Kaich, 2020, p. 290; Morren & Grinstein, 2016), but that the relationship between attitudes and behavior is also stronger in developed than developing countries (Pisano & Lubell, 2017). Because pro-environmental attitudes explained the greatest amount of variance in PEB in the models, the models likely perform better in countries that are considered "developed" by the World Population Review.

Indeed, countries with the highest explained variance in PEB have Human Development Index (HDI) scores above .8, the World Population Review's cutoff for "developed" status (Developed Countries List 2020, 2020; see Table 13). Conversely, all countries with the lowest model fit have HDI scores below .8. In Kenya, the country with the least variance explained, the HDI score is the lowest of all countries analyzed. This pattern is not entirely consistent across the remaining four countries, as models tested in some countries with lower HDI scores explained more variance in PEB than we would expect if HDI fully accounted for country-level differences. Still, exploratory two-tailed bivariate correlations revealed a significant relationship between countries' HDI scores and the total variance explained in each country by the general model ($r = .746$, $p = .005$; Figure 2). Conversely, the relationship between countries' press freedom scores and the total variance explained in each country by the general model was not significant ($r = -.266$ $p > .1$; Figure 3). Although the inclusion of country-level variables in the models is beyond the scope of this study, the significant relationship between HDI scores and total variance explained suggests that an analysis of multi-level models with HDI scores as country-level factors is an important area for future research.

Theoretical Implications

Model Variables

This study demonstrates the consistency and/or variability of the central predictors of PEB across a wide range of countries and their contexts. The strong relationships between pro-environmental attitudes and PEB, both in the general sample and across countries, lend support to the large body of literature indicating that that people's pro-environmental attitudes can influence their behavioral intentions and enacted PEB across ages, behavior types, and nationalities (e.g., Axelrod & Lehman, 1993; Bilandzic & Kalch, 2022; Bozorgparvar, 2018; Hines et al., 1987; Kim et al., 2013; Lee et al., 2014; Meinhold & Malkus, 2005; Oreg & Katz-Gerro, 2006; Wang, 2017), and aligns with the assumptions of rational choice models such as the TRA and TPB (Ajzen, 1991; Bilandzic & Kaich, 2020; Fishbein, 1979).

The significant relationships between efficacy and PEB across the majority of the models support behavior change theories that highlight the role of efficacy in enabling or motivating individuals to translate attitudes into concrete action (McDonald, 2014). These theories include the TPB (Cheung et al., 1999; Heeren et al., 2016; Oreg & Katz-Gerro, 2006; Wang, 2019), social cognitive theory (SCT; Doherty & Webler, 2016; Hamann & Reese, 2020), and protection motivation theory (PMT; Kim et al., 2013; Wang, 2019), that propose efficacy has a direct effect on behavior by focusing attention (Kanfer et al., 1996), affecting perception of goal difficulty and goal commitment (Locke & Latham, 2002), helping assign resources to the goal (Vancouver et al., 2008), and fostering searching for better strategies (Tabernero & Wood, 1999; as summarized by Tabernero & Hernandez,

2011, p. 611).

Nevertheless, the smaller relationship between efficacy and PEB than between pro-environmental attitudes and PEB also suggests that the role of efficacy may be limited, especially when examining PEB in cross-country samples. In three of the 12 countries analyzed, efficacy did not explain significant unique variance in PEB, and in an additional three countries, efficacy explained less than 10% of unique variance in PEB. Although the role of pro-environmental attitudes in PEB can be applied across countries, scholars should take a cautious approach to generalizing efficacy findings across international boundaries.

The inconsistent results examining the moderation role of efficacy also has theoretical implications. In the general cross-country sample, significant interactions were found in three of the four mismatch models, in only one of the matching models, and was not significant in the general model. That moderation plays a role primarily in the mismatches may shed light on inconsistent prior research about the moderation role of efficacy in the attitude-behavior relationship. For example, it is possible that higher levels of efficacy in one domain override effects of pro-environmental attitudes in a different domain, thus leading to weaker engagement in PEB. Future research is needed to determine the generalizability of these findings.

Media Variables

Although specific hypotheses focused on relationships between media exposure and environmental attitudes (supported by the results), media exposure, both to general news and to environmental content, was related to all of this study's model variables, though the relationships with PEB were particularly strong. These findings have implications for media research, both in general and directed at environmental issues.

Although previous research found that the amount of media attention devoted to environmental issues corresponds to the amount of public salience (Ader, 1995) and public concern (Harring et al., 2011) for the issue, the above results suggest that the primary influence of media exposure may not be on pro-environmental attitudes, but rather directly on behavior. It appears that exposure to media, especially media related to environmental issues, does not have to raise individuals' pro-environmental attitudes to increase their likelihood of engaging in PEBs. These results align with social cognitive theory (SCT), which postulates that behaviors can be modeled through mass communication channels, which can lead consumers of this mediated information to adopt similar behaviors themselves (Bandura, 2001). It appears that media exposure provides individuals with a set of behavioral rules to apply when considering environmentally relevant behaviors (Bandura, 2001). Although the results of this study suggest that SCT provides an explanation for media's effects on PEB, additional research on media's influence on pro-environmental attitudes and PEB is needed.

Country-Level Differences

Pro-environmental attitudes, efficacy, media exposure, and mediated civic activism, were consistently related to PEB, or nearly so, across countries. These findings align with previous international studies that demonstrate consistent influences of pro-environmental attitudes, efficacy, and norms on PEB (see Appendix), though this study is one of the few to compare findings across countries. Furthermore, descriptive environmental social norms and the SES ladder maintained nearly consistent relationships with PEB across countries. The consistency of relationships between these model variables and PEB indicate that theories applying these variables, including rational choice models such as the TPB and pro-social

behavioral models such as the norm activation model and value-belief-norm model, are likely to be applicable across countries (Bilandzic & Kaich, 2020). These results also support the applicability of media effects models such as agenda setting theory and SCT across countries.

The low amount of unique variance explained by country-level factors in the general model provides further support for the cross-country use of these behavior models. In the general model, country-level influences (admittedly aggregated and unidentified) explained less than 6% of unique variance in PEB, which suggests that the relative influences of pro-environmental attitudes and efficacy far outweigh country-specific influences. In the (mis)match models using public PEB as an outcome variable, however, country-level factors explained up to 14.0% of unique variance in PEB, or 37.4% of the total explained variance in the models. Although the amount of unique variance explained by country-level influences in these (mis)match models is still much less than that explained by pro-environmental attitudes, the stronger connections between country-level influences and public or private PEB than with general PEB is worth mention. It appears that specifying the domain of PEB allows country-level effects to emerge in the model to a greater extent than using general measures of PEB.

These findings suggest that country influences are more likely to affect specific types of behavior, rather than broad engagement in PEB. Scholars have examined many cultural influences, such as postmaterialist values (Oreg & Katz-Gerro, 2006), human development indices (Morren & Grinstein, 2016; Pisano & Lubell, 2017), and individualism vs. collectivism (Eom et al., 2016; Morren & Grinstein, 2016; Tam & Chan, 2017), which indicate that country-level contexts can facilitate or detract from PEB. Future studies that disentangle these cultural effects from the subdimensions of PEB can provide further insight

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into their impacts on relevant environmental behaviors.

Practical Implications

It is important to note that the effect sizes for each of these relationships were very small. Such findings are not unexpected because in any given moment, the behaviors that an individual chooses to perform depend on myriad contextual factors, only some of which are possible to measure or account for. In addition, most structures and resources required to perform PEBs exist at the system- or country-level, so individual attitudes can only have a small potential influence on people's engagement in PEBs. Bilandzic and Kaich (2020) further note "much of the behaviors that are relevant for the environment are habitual, executed following a shortcut from situational cues and demands to behavior, without intervening reflects about costs and benefits" (p. 296). However, in all models besides Kenya, the main constructs and covariates explain between a quarter and a half of the variance in PEB, so combinations of even small influences might be associated with substantial aggregate effects.

Although these results indicate that improving individuals' pro-environmental attitudes, efficacy, perceived SES position, and exposure to media may facilitate their engagement in PEB, I must emphasize that these correlational relationships do not necessarily represent causal effects. Therefore, it is unclear whether targeting any of these constructs individually will yield the behavioral changes sought in large-scale environmental communication campaigns.

Limitations

These findings are subject to the limitations associated with using secondary data. Although the measures provided by the National Geographic Society were developed based

on prior research, some measures were limited in the degree to which they represent the precise nature, number of items, and breadth of the construct they intended (or I would wish) to represent. For example, the items used to measure efficacy had low construct validity; future studies should consider employing the validated scale developed by Moeller and Stahlmann (2019), or measuring efficacy as it relates to performing the specific PEBs used in the study's PEB scale. Additionally, PEB was measured with five items, a list that is certainly not exhaustive and also is not equally applicable for every participant. Different countries and contexts may foster or obstruct some of these five PEBs in different ways, and there are other kinds of PEBs in which individuals may have been participating. However, these data contributed to one of the study's main strengths: the ability to compare predictors of PEB across large, high-quality samples from 12 very different countries. The preliminary tests, the appropriate statistical analyses, and the ability to control for six known covariates of PEB also contributed to the rigor of this study.

Future Directions

Although these findings advance our understanding of theory and provide international insights regarding commonly discussed relationships, more research is needed to accurately understand the common and contextual influences on PEB.

The measures developed by National Geographic used some previously validated items, however, additional analyses using scales with higher construct validity are needed to increase confidence in these results. The combined measure of environmental attitudes performed well across countries, but both measures of efficacy and measures of PEB can be improved for future studies. For efficacy, the literature review indicates that distinguishing between a sense of efficacy in one's, or one's country's, ability to perform a behavior, from

response efficacy, the ability for one, or one's country, to achieve a goal, could further clarify nuances in the construct. Furthermore, efficacy measures can be matched to the specific concept and behavior measured in the study. Similarly, broader measures of PEB that capture a range of relevant cross-country public and private behaviors can clarify differential engagement in PEBs across countries. Potential future items could include "conserve water or energy in my home" (private; Larson et al., 2015, p. 116), "Re-use or repair items instead of throwing them away" (private; Loy & Spence, 2020, p. 6), "Participate as an active member in a local environmental group" (public; Larson et al., 2015, p. 116) and "Voted to support a policy/regulation that affects the local environment" (public; Larson et al., 2015, p. 116).

Results of this study shed light on the variability of the relationships between pro-environmental attitudes, efficacy, and PEB across countries. However, with a sample of only twelve countries, I can only speculate as to the country-level factors that influence these relationships. Future research on PEB and its antecedents across a sufficient number of countries for multi-level modeling can provide insight into the country-level contexts that affect the relationships between EA, efficacy, and PEB. Specifically, future research can explore how country-level factors such as politics and public policy influence individuals' sense of efficacy and engagement in PEBs. As noted in the literature review, individuals cannot perform PEBs without available infrastructure and resources. Clarifying the role of these country-level factors on efficacy and PEB would provide a valuable contribution to the literature.

Furthermore, prior research shows that a range of covariates are potentially associated with PEB, such as political ideology (Feygina et al., 2011) and religious affiliation (Morrison

et al., 2015), which would be important to consider in future research. While the results here support the attitude-behavior link (esp. as proposed in the TPB), the weak and variable explanatory significance of efficacy raises questions about its role in engaging in pro-environmental behaviors.

Conclusion

As increasingly dire reports demonstrate the consequences of human action on the environment (IPCC, 2021), there is an urgent need to promote global engagement in PEB. Understanding the psychological underpinnings of PEB is an important foundation that informs experimental research and strategic interventions. Understanding how the relationships between attitudes, efficacy, and behavior vary (or remain consistent) around the world adds important nuance to our theoretical and practical knowledge base. This study finds that pro-environmental attitudes are a far stronger predictor of PEB than efficacy beliefs in all countries studied. Further, exposure to general news media, exposure to environmental media content, mediated civic activism, efficacy (self- and collective), descriptive environmental social norms, and perception of SES all explain significant unique variance in PEB across countries. Counter to expectations based on prior research, I find that models that match variables on domain do not outperform models testing general variables or mismatch variables on domain. Together, these findings point to environmental attitudes as being the strongest link to pro-environmental behavior both globally and within diverse individual countries.

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Table 1

Selected Environmental Contexts for 12 Countries

Australia
　　Australia is one of the most biodiverse countries in the world and is home to the largest coral reef in the world—the Great Barrier Reef. The country has large reserves of natural resources. Coal is one of Australia's most abundant natural resources, accounting for approximately 29% of the world's coal exports, making Australia the world's largest net exporter of coal. https://www.cia.gov/the-world-factbook/countries/australia/ However, Australia also has a deep history of environmentalism, from the creation of Keep Australia Beautiful in the 1960s to fight littering, to ongoing movements to move Australia towards 100% renewable energy. https://kab.org.au/ https://350.org.au/ In 2019, the environment emerged as Australians' top election issue, with 29% of Australians rating it as their most important issue—up from just 9% in 2016. https://www.abc.net.au/news/2019-04-17/vote-compass-election-most-important-issues/11003192 However, like the United States, Australia has a vocal anti-environment minority that stands in opposition to the pro-environment majority, and is aligned with political ideology. Further, Australia ranks last out of 57 countries in a recent analysis and ranking of policy responses to climate change. https://www.theguardian.com/environment/2019/dec/11/australia-ranked-worst-of-57-countries-on-climate-change-policy
　　Although Australia does not explicitly protect its citizens' rights to freedom of expression, the country enjoys a free press where journalists are unrestricted in their reporting of most topics. As long as journalists, commentators, and ordinary internet users do not attempt to publish speech that breaches criminal laws or amounts to defamation (such as those regulating hate speech or racial vilification), they are unlikely to be censored. Australians can access a broad landscape of online news sources conveying diverse political and social viewpoints. However, ownership concentration, whistleblower and defamation laws, and suppression orders limit this diversity for both online and traditional news journalism. https://freedomhouse.org/country/australia/freedom-net/2021 In 2017, Australia's total Freedom of the Press score was 22/100 (Freedom House, 2017).

Brazil
　　Brazil is home to a rich natural environment, which comes with competing interests to extract—or protect—natural resources in the region. Brazil's geography is approximately 62% forest, making deforestation a major environmental hazard. https://www.cia.gov/the-world-factbook/countries/brazil/ Brazilians have long expressed their concern over the environmental issues they face. For example, in a 2010 survey of 22 countries, Brazil was the most concerned that climate change is a very serious problem, and 80% of Brazilians reported that protecting the environment should be prioritized over economic growth. Indeed, in spite of the anti-environmentalism of the current Bolsonaro administration, Brazil has a history of grassroots environmentalism. https://www.dukeupress.edu/Greening-Brazil/
　　Brazil is home to some of the most progressive and comprehensive legislation regarding digital rights. However, high levels of violence and harassment, paired with impunity, threaten both independent journalists and civil society activists in Brazil. There is an increasing number of criminal investigations against critics of the Bolsonaro

administration, approval of legislation that undermines freedom of expression and criminalizes content, and monitoring of activists, journalists, and members of the political opposition on social media. Legal threats, including lawsuits, are frequently used to restrict the circulation of content criticizing political authorities, https://freedomhouse.org/report/freedom-press/2017/press-freedoms-dark-horizon, and the government often requests that content be removed from social media platforms. Manipulated content, including fake news, is common, and often created or exacerbated by the political administration. https://freedomhouse.org/country/brazil/freedom-net/2021 In 2017, Brazil's total Freedom of the Press score was 47/100 (Freedom House, 2017).

China

China is the world's most populous country, with about 1.4 billion people. The leading environmental hazard in China is air pollution, with multiple organizations estimating that air pollution in China leads to more than one million deaths per year. https://www.theguardian.com/environment/2016/sep/27/more-than-million-died-due-air-pollution-china-one-year; https://www.scmp.com/news/china/science/article/2166542/air-pollution-killing-1-million-people-and-costing-chinese However, in the last several years, the Chinese government has taken aggressive action—declaring a "war against pollution"—and has seen substantial improvements in air quality in just a four-year span. https://epic.uchicago.cn/wp-content/uploads/sites/2/2019/11/Is-China-Winning-Its-War-on-Pollution.pdf Because China's one-party government controls the military, the state, and the media, the government's actions and rhetoric can have more of a uniform influence on people's attitudes and actions.

Freedom House named China the "world's worst abuser of internet freedom" for seven consecutive years. https://freedomhouse.org/country/china/freedom-net/2021 Physical and online monitoring is commonplace for journalists in China, where the government has near complete, and increasingly repressive, control over the domestic media. https://freedomhouse.org/report/freedom-press/2017/press-freedoms-dark-horizon Legislation, regulatory investigations, and administrative fines are common ways that the Chinese authorities prevent freedom of expression. Users of online media face severe legal ramifications for communicating with family members overseas, stating their religious beliefs, and sharing news stories. Still, journalists, activists, bloggers, and ordinary internet users push back against the severe censorship by sharing information, calling for redress for government abuses, and criticizing authorities through online media. https://freedomhouse.org/country/china/freedom-net/2021. In 2017, China's total Freedom of the Press score was 87/100 (Freedom House, 2017).

India

India is a large, diverse nation. With more than 1.3 billion people, much of India's population is densely populated in major cities, although a significant portion of the population remains spread out in rural areas. Large environmental problems arise from systemic issues in India, including the lack of access to sanitation facilities (37% in urban areas; 71% in rural areas), waterborne disease from raw sewage, and significant air pollution. https://www.cia.gov/the-world-factbook/countries/india/ These issues account for many of the top causes of death in India. http://censusindia.gov.in/vital_statistics/causesofdeath.html However, conditions in India

are highly variable when it comes to exposure to those hazards (e.g., water pollution resulting from lack of access to sanitation facilities). A majority of Indians support a wide range of policies that address major environmental issues, including reducing the number of coal-burning power plants, expanding forested areas, and generating more electricity from renewable sources. https://climatecommunication.yale.edu/publications/climate-change-in-the-indian-mind/ Public support for reducing the number of coal-burning power plants is especially encouraging because India has the fourth largest coal reserves in the world and might be a tempting economic resource. https://www.cia.gov/the-world-factbook/countries/india/

 Internet freedom in India has been weakening over the past four years, spurred by new mation Technology Rules that mandated digital news and streaming services adhere to a Code of Ethics and required social media companies to increase retention of personal data and moderate online content. Often, authorities mandate that content be removed despite the fact that it is protected under international human rights standards. Internet shutdown orders are common in India during times of dissent, as are requests to remove content criticizing authorities. Harassment of journalists, NGOs, and government critics has increased under the regime led by Prime Minister Narenda Modi and the Bharatiya Janata Party. Furthermore, court and government orders to block political and social information are infrequently made public, making it difficult to assess what content has been censored. https://freedomhouse.org/country/india/freedom-net/2021. In 2017, India's total Freedom of the Press score was 43/100 (Freedom House, 2017).

Indonesia

 Indonesia has a natural environment that is diverse in wildlife and natural resources. About half (52%) of its land is represented by forests. https://www.cia.gov/the-world-factbook/countries/indonesia/ This makes deforestation a major environmental issue for the country, in addition to droughts, tsunamis, and earthquakes. Making environmental risks worse, deforestation is incentivized by what some call a "modern-day gold rush": the production of palm oil. It is a multi-billion-dollar industry in Indonesia, making it difficult even for law enforcement to stop illegal forest fires. Another major environmental challenge for Indonesia is that it contains some of the most densely populated urban centers in the world, making it the world's fourth-most populated country. Bohensky et al. (2013) surveyed 6,310 households in Indonesia and produced insights regarding engagement with the issue of climate change. Results showed that high rates of awareness and personal experience (82%), and perceived risk (71%) of climate change was often not enough to produce reactive (39%) and proactive (28%) action on the issue.

 New regulation in Indonesia limits the country's internet freedom by imposing takedown and registration requirements on myriad technology companies. These regulations, in combination with continued criminal charges and harassment of government critics, journalists, and ordinary internet users frequently prohibit content that the government believes is "negative," a broad term that encompasses defamatory content and content that violates social norms. The government frequently requires platforms to remove this negative content, often pursuing legal action, which has forced many reporters to self-censure. Together, the "coordinated manipulation of online content by the government, its allies, and other political actors has distorted the information landscape" in Indonesia.

Although freedom of expression is given some legal protection, in practice, this right is frequently overlooked. https://freedomhouse.org/country/indonesia/freedom-net/2021. In 2017, Indonesia's total Freedom of the Press score was 49/100 (Freedom House, 2017).

Kenya

Kenya is a diverse east African nation that generates nearly all of its energy from renewable sources, primarily via hydropower and geothermal. In late 2019, Kenya passed the 90% mark for the proportion of their energy generated from renewable sources. https://af.reuters.com/article/topNews/idAFKBN1YH1JC-OZATP\ However, Kenyans experience significant environmental hazards including drought, and significant flooding during rainy seasons. https://www.cia.gov/the-world-factbook/countries/kenya/ One of the most significant environmental issues for Kenyans is water pollution. This is driven by the structural issue for a large majority of Kenyans (approximately 70%) lacking access to sanitation facilities. In one study, 84% of Kenyan respondents agreed that "promoting a clean environment" should be a top priority for human rights organizations in the country. https://www.pewresearch.org/global/2017/10/03/attitudes-toward-human-rights-organizations-india-indonesia-kenya-mexico/

Kenya has a diverse and vibrant media landscape that includes outlets for various viewpoints and issues. https://freedomhouse.org/country/kenya/freedom-net/2021. The country has experienced a recent rollback of media laws that limited press freedom; however, security legislation still permits the criminal prosecution of journalists, and violent attacks against media workers are on the rise. https://freedomhouse.org/report/freedom-press/2017/press-freedoms-dark-horizon. Blocking of political and social content is infrequent in Kenya, though removal of online content that the government deems immoral or defamatory is increasing. Still, Kenyans are free to use online resources, including social media platforms, to coordinate political campaigns, even those involving politically sensitive topics. https://freedomhouse.org/country/kenya/freedom-net/2021. In 2017, Kenya's total Freedom of the Press score was 58/100 (Freedom House, 2017).

Mexico

Mexico has a diverse set of natural resources including petroleum, natural gas, and timber. A majority (55%) of Mexican land is used for agriculture, and about one third (33%) is forest. Mexicans face several significant environmental issues, including air and water pollution, scarcity of facilities dedicated to processing hazardous waste, and deforestation. https://www.cia.gov/the-world-factbook/countries/mexico/ Issues of civil rights, race, and class have a history of being fused with environmentalism. Pollution and hazardous waste are part of the daily lives of many Mexicans, so seeing a clean, healthy environment can be considered an important human right (Carruthers, 2008).

Mexico is one of the world's deadliest countries for journalists, in part due to President Andrés Manuel López Obrador's press stigmatization. Because of the continuous violence and harassment against the media, many journalists practice self-censorship,

especially in states that have high rates of violent crime. https://freedomhouse.org/country/mexico/freedom-net/2021#footnote2_4ioqqab. A recent study indicated that 21% of the digital outlets surveyed avoided releasing information about specific topics, people, or institutions because of threats or intimidation (Sembra Media, 2020). In 2017, Mexico's total Freedom of the Press score was 64/100 (Freedom House, 2017).

South Africa

  South Africa is an increasingly diverse nation, with natural resources ranging from precious metals including gold and platinum to energy sources such as coal and natural gas. https://www.cia.gov/the-world-factbook/countries/south-africa/ The vast majority of land (about 79%) is dedicated to agriculture. This strong emphasis on land dedicated to agriculture, together with widespread lack of access to sanitation facilities, water pollution is a significant problem in South Africa. Although the South African public already holds pro-environmental attitudes, some may be limited in their ability to act on those attitudes due to a lack of access to alternative consumer products or internet access.

  Although there have been no recent reports of content blocking or restrictions on the public's use of social media for online mobilization in South Africa, self-censorship and online harassment occur frequently. Notably, during the 2019 elections, the severity of online attacks against journalists increased, prompting higher levels of online self-censorship. Still, both professional journalists and general online users continue to publish content on politically sensitive topics. Overall, the online environment is net neutral, a goal to which both the government and South Africa's nonprofit Internet Service Providers' Association remain committed. Individuals in South Africa are not prosecuted, detained, or sanctioned by the state for online media reporting. https://freedomhouse.org/country/south-africa/freedom-net/2021. In 2017, South Africa's total Freedom of the Press score was 38/100 (Freedom House, 2017).

South Korea

  South Korea is a country whose population is densely populated in urban areas (approximately 81%), with a large majority of forest land (64%). https://www.cia.gov/the-world-factbook/countries/south-korea/ A key natural resource in South Korea is coal. The country relies somewhat heavily on coal for energy, accounting for about 29% of their energy consumption, with a plurality (about 44%) coming from oil imports. https://www.climatescorecard.org/2019/05/south-korea-continues-to-rely-heavily-on-coal-as-an-energy-source/ High population density, rapid industrialization, and a strong reliance on fossil fuels makes air pollution a significant environmental hazard in South Korea. Despite a continued strong reliance on energy sources that cause environmental harm, environmental concern in South Korea has been growing for decades, with sharp changes observed in the 1980's and 90's (Kern, 2010). Further, more recent research in 2019 shows that South Korea is a leader in taking seriously the threat of climate change. For example, in a survey of 26 countries, South Korea ranked second in seeing the major threat of climate change—with 86% of respondents rating the issue a major threat. https://www.pewresearch.org/fact-tank/2019/04/18/a-look-at-how-people-around-the-

world-view-climate-change/ Koreans have high risk perceptions regarding climate change compared to many other surveyed countries. https://www.pewresearch.org/fact-tank/2019/04/18/a-look-at-how-people-around-the-world-view-climate-change/

In South Korea, the constitution grants freedom of speech, the press, assembly, and association, but also enables restrictions to reported content. Therefore, Freedom House describes South Korea's overall media environment as "partly restricted yet relatively diverse" https://freedomhouse.org/country/south-korea/freedom-net/2021. Service providers can block or remove content that they deem violates the law, goes against social norms, or that is political in nature. Because of this climate, some online users self-censor to avoid criminal charges for defamation. Still, South Korea does not have economic or regulatory constraints that systematically interfere with mediated content production or publication. New alternative and activist media outlets challenge these restrictions and provide South Koreans with information regarding sensitive political issues. In 2017, South Korea's total Freedom of the Press score was 34/100 (Freedom House, 2017).

United Arab Emirates

The United Arab Emirates (UAE) is a country with natural resources almost entirely centered around petroleum and natural gas. https://www.cia.gov/the-world-factbook/countries/united-arab-emirates/ Under five percent of land is dedicated to agriculture, given the difficulty of growing crops in the mostly-desert climate. Their economy is heavily reliant on their natural resources, which are almost entirely centered around petroleum and natural gas. https://news.gallup.com/poll/142727/religiosity-highest-world-poorest-nations.aspx This likely makes it difficult to gain public and governmental support for some environmental protections, especially the regulation of the use of fossil fuels. Other important environmental issues are growing as the population grows. This includes air pollution and water scarcity. Abdelrahman et al. (2019) found that a large majority of Emiratis are trying to save water and are willing to support structural changes to make water usage more efficient.

Despite being "one of the world's most connected countries," citizens of the UAE have limited access to diverse reporting https://freedomhouse.org/country/united-arab-emirates/freedom-net/2021. The state owns the UAE's internet service providers, giving the government control over the online dissemination of information. Beyond blocking content that the telecommunications regulatory authority mandates such as terrorism, pornography, gambling, and threatening political speech, authorities often block speech that criticizes the government or comments on social taboos. This censorship is paired with criminal penalties for many online activities. Furthermore, the government manipulates online information to advance its own interests. Although some Emiratis engage in online activism to push back against the repressive regulations, the arrests, intimidation, surveillance, and retaliation they face limits their effectiveness and requires many of these activists to speak out from outside the UAE. https://freedomhouse.org/country/united-arab-emirates/freedom-net/2021. In 2017, the United Arab Emirates' total Freedom of the Press score was 78/100 (Freedom House, 2017).

United Kingdom

The United Kingdom (UK) has a rich set of natural resources, especially those that pollute the environment when burned to generate energy. Among the most abundant are

coal and natural gas. https://www.cia.gov/the-world-factbook/countries/united-kingdom/
However, a recent report from October 2019 shows that renewable energy generation in the UK has now surpassed that of fossil fuels.
https://www.theguardian.com/business/2019/oct/14/renewable-electricity-overtakes-fossil-fuels-in-uk-for-first-time The UK has a long history of major air pollution problems—one of the most well-known being the infamous Great Smog of 1952, where at least 4,000 people died from pollution-related illness over a time period of just weeks.
http://news.bbc.co.uk/onthisday/hi/dates/stories/december/9/newsid_4506000/4506390.stm
Although the UK has seen significant progress over the last several years, air pollution is still a major problem. A 2016 report estimates that about 40,000 people in the country die early each year because of air pollution.
https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution However, the UK has made substantial progress in shifting towards renewable energy. A recent report from October 2019 shows that renewable energy generation in the UK has now surpassed that of fossil fuels.
https://www.theguardian.com/business/2019/oct/14/renewable-electricity-overtakes-fossil-fuels-in-uk-for-first-time

The UK followed other European countries in regulating online platforms and content hosts to remove illegal or harmful content. Although copyright-infringing material, promotion of terrorism, and depictions of child sexual abuse are blocked by service providers, other information including political, social, and cultural content remain unrestricted. In addition, these regulations and procedures are transparent, proportional, and open to correction if necessary. Self-censorship is low, the online landscape is diverse, and online mobilization tools are easy to access. https://freedomhouse.org/country/united-kingdom/freedom-net/2021 In 2017, the United Kingdom's total Freedom of the Press score was 25/100 (Freedom House, 2017).

United States

The United States is a diverse nation—not only in demographics such as race, ethnicity, and socioeconomic status, but also in opinions about environmental issues. Overall, the U.S. tends to rank towards the global bottom in terms of adopting serious policy toward key environmental issues such as climate change. For example, in a survey of 26 counties, the U.S. ranked 20th on the public's perceived level of threat of climate change, with only 59% of respondents agreeing the issue is a major threat. This lackluster response to environmental issues is a byproduct of political polarization on these issues. Environmental attitudes, such as valuing nature, also vary widely across political ideology, though not otherwise much by basic demographics. https://www.pewresearch.org/fact-tank/2019/04/18/a-look-at-how-people-around-the-world-view-climate-change/;
https://climatecommunication.yale.edu/publications/politics-global-warming-november-2019/

The First Amendment of the United States constitution protects free speech and freedom of the press, positions that the Supreme Court has held to the highest level of constitutional protection. In part because of these protections, the online landscape in the US is vibrant, diverse, and largely free from state censorship. Current regulations do not allow the government to block or remove content from broad categories of websites. However, government authorities are increasingly responding to nationwide protests with

surveillance, harassment, and arrests, which limit citizens from engaging in both physical and mediated activism. Furthermore, false and misleading information is frequently disseminated within the US. Still, reports of self-censorship are rare, though social media users appear to adjust their online behaviors based on their perception of government surveillance. https://freedomhouse.org/country/united-states/freedom-net/2021 In 2017, the United States' total Freedom of the Press score was 23/100 (Freedom House, 2017).

Table 1 References

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Table 2

Hypothesized Moderation Relationships among Combinations (Matches and Mismatches) of

Attitude, Efficacy, and Pro-Environmental Behaviors

	Efficacy			
	Self-Efficacy		Collective Efficacy	
	Pro-Environmental Behaviors			
Environmental Attitudes	**Private**	**Public**	**Private**	**Public**
Valuing Nature	**H4a** ++	H4b +	H4e +	H4f +
Environmental Concern	H4c +	H4d +	H4g +	**H4h** ++

Note: + or ++ indicate proposed general relative PEB variance explained of combination relationships; ++ indicate proposed matching relationships, indicated in **bold**.

Table 3

Overall Descriptives

Model Concepts M/ SD or %	All	US	Mex	Bra	UK	SA	Ken	Chi	SK	Ind	Aus	UAE	Indo
Please read the following statements and tell us how much you agree or disagree with each. There are no right or wrong answers. *Strongly disagree* (1) to *Strongly agree* (5)													
Conserving natural resources is important for the country's economy	4.34/ .86												
Conserving nature is a reflection of my core moral beliefs and convictions	4.07/ .96												
Nature is important to me, to who I am as a person	4.23/ .92												
Protecting nature is important for people's health	4.41/ .83												

Being in/seeing nature brings people pleasure or satisfaction	4.30/ .86											
Valuing nature (Mean of Valuing items) (1-5) α = .84	4.27/ .69	4.11/ .75	4.55/ .55	4.43/ .59	4.11/ .70	4.42/ .60	4.40/ .68	4.33/ .55	3.99/ .62	4.01/ .72	4.07/ .75	4.27/ .79	4.56/ .54

Here is a list of issues that may or may not be a concern. How concerned are you personally with each of the following global issues? *Not at all concerned* (1) to *Very concerned* (5)

Habitat loss	4.14/ .97
Plastic pollution	4.32/ .91
Global climate change	4.24/ 1.00
Species at risk of extinction	4.16/ .97
Air pollution	4.36/ .88
Lack of clean drinking water	4.30/ .94

Environmental concern (mean of Concern items) (1-5) α = .87	4.25/ .73	4.01/ .86	4.59/ .56	4.50/ .63	4.09/ .74	4.47/ .63	4.33/ .76	4.13/ .62	4.18/ .68	4.04/ .71	4.11/ .76	4.11/ .84	4.48/ .62
Environmental Attitude (mean of Valuing and Concern items) α = .89	4.26/ .64	4.06/ .73	4.57/ .49	4.47/ .54	4.10/ .65	4.44/ .55	4.36/ .62	4.22/ .51	4.09/ .58	4.03/ .65	4.10/ .68	4.19/ .73	4.51/ .50

Please rate how confident you are that **YOU AS AN INDIVIDUAL** can attain the following goals in the next 10 years. *Cannot do at all* (0) to *Highly certain can do* (100)

Protect habitats	44.94/ 31.2
Reduce plastic pollution in our oceans	53.85/ 31.8
Reduce use of fossil fuels (e.g., petroleum, natural gas, coal)	46.97/ 30.28
Save animals at risk of extinction	40.96/ 31.51

Self-efficacy index α = .86	46.68/ 26.17	38.93/ 26.92	57.05/ 26.68	55.83/ 27.34	37.32/ 24.56	46.79/ 26.39	47.42/ 22.65	50.77/ 23.68	42.55/ 22.41	39.70/ 25.95	41.10/ 26.68	48.60/ 25.59	54.06/ 24.84

Please rate how confident you are that **YOUR COUNTRY** can attain the following goals in the next 10 years. *Cannot do at all* (0) to *Highly certain can do* (100)

Protect habitats	48.00/ 29.04
Reduce plastic pollution in our oceans	49.20/ 29.51
Reduce use of fossil fuels (e.g., petroleum, natural gas, coal)	45.42/ 28.65
Save animals at risk of extinction	46.33/ 29.32

Collective efficacy index α = .89	47.24/ 25.27	46.07/ 26.40	50.39/ 26.52	47.33/ 28.63	44.39/ 24.36	40.73/ 26.94	52.70/ 20.80	49.78/ 22.79	43.38/ 21.16	40.24/ 24.66	47.61/ 25.79	52.17/ 25.78	52.03/ 24.12
Efficacy (mean of Self, Collective efficacy) α = .90	46.96/ 22.91	42.50/ 23.57	53.72/ 23.34	51.58/ 24.28	40.85/ 21.34	43.76/ 22.66	50.06/ 18.22	50.28/ 21.89	42.97/ 19.65	39.97/ 23.58	44.35/ 23.34	50.39/ 23.71	53.05/ 22.53

Here is a list of things that some people do regularly and some people do not. Over the past 12 months, how frequently did you personally engage in the following behaviors? *Never* (1) to *All the time* (5)

Recycle	3.85/ 1.08												
Use your own reusable shopping bags	3.91/ 1.08												
Pro-environmental behaviors (private) index α = .58 (mean of private PEBs)	3.88/ .91	3.71/ 1.08	3.95/ .81	3.77/ .91	4.57/ .65	3.81/ .96	3.58/ .86	3.98/ .68	3.88/ .82	3.64/ .81	4.45/ .69	3.79/ .95	3.46/ .88

Here is a list of things that some people do

regularly and some people do not. Over the past 12 months, how frequently did you personally engage in the following behaviors? *Never* (1) to *All the time* (5)

Avoid products with ingredients that are bad for the environment	3.50/ 1.05												
Talk to friends or family about an environmental issue	3.35/ 1.09												
Used social media to share information about an environmental issue	3.00/ .21												
Pro-environmental behavior (public) (mean of public PEBs) α = .75	3.29/ .94	2.68/ .99	3.58/ .81	3.46/ .87	2.81/ .92	3.31/ .94	3.13/ .92	3.60/ .71	3.03/ .83	3.57/ .77	2.87/ .98	3.73/ .89	3.66/ .76
General pro-environmental behavior (mean of private and public PEBs) α = .71	3.52/ .76	3.09/ .87	3.73/ .72	3.59/ .79	3.51/ .63	3.51/ .84	3.31/ .75	3.75/ .60	3.37/ .70	3.60/ .69	3.50/ .68	376/ .82	3.58/ .72
Media exposure: General news media (% in category)	1.92/ 1.21	1.31/ 1.21	1.99/ 1.11	2.43/ 1.14	1.30/ 1.08	1.83/ 1.21	1.78/ 1.05	2.42/ 1.06	2.19/ 1.25	1.52/ .90	1.35/ 1.17	2.33/ 1.11	2.62/ 1.14
0			7.8%	4.0%			8.8%	2.3%	7.6%	6.6%		3.6%	3.9%

1	11.7	31.3	27.2	17.3	25.1	13.0	35.1	17.3	25.2	52.0	26.4	19.9	12.2
2	%	%	34.2	34.0	%	%	33.4	35.5	30.3	28.9	%	35.6	31.0
3	28.3	29.8	19.9	21.5	38.4	30.1	15.1	25.4	14.3	8.3	35.1	21.4	24.3
4 or more	30.3	23.3	10.9	23.2	23.1	31.5	7.6	19.5	22.6	4.2	22.7	19.5	28.6
	15.6	8.0			8.7	11.9					8.7		
	14.1	7.6			4.7	13.5					7.1		

	% Yes
How do you typically learn about issues that affect the environment? Please select all that apply.	
Print or online publications	47.4
Television shows or documentaries	70.2
Facebook (not displayed in China)	36.2
Instagram (not displayed in China)	17.6
Twitter (not displayed in China)	12.6
YouTube (not displayed in China)	31.9
WhatsApp	15.2
Books	24.0

Other	4.6												
None of the above [* not included in overall index]	3.6												
Media exposure: Environmental content index a	2.55/ 1.79	1.92/ 1.37	3.16/ 1.67	3.15/ 1.85	1.92/ 1.40	3.19/ 1.75	2.11/ 1.83	1.49/ .98	2.14/ 1.41	2.64/ 1.85	2.01/ 1.44	3.35/ 2.01	3.54/ 2.04
In the past 12 months, have you participated in any of the activities listed below?	% Yes												
Contacted a politician (Email, phone, any social media, etc.)	9.1												
Wrote a letter to the editor of a publication	4.3												
Called into a live news broadcast	3.6												
Wrote an article for a publication (magazine/newspaper/news website/blog)	6.8												
Posted to an online forum or blog	18.2												
Mediated civic activism index a	.42/ .77	.39/ .68	.31/ .66	.44/ .82	.36/ .69	.41/ .73	.21/ .49	.58/ .91	.37/ .70	.34/ .65	.43/ .76	.71/ 1.03	.49/ .87

Demographics

Age (Years, % in category)	40.8 3/	48.6 2/	40.1 3/	41.3 5/	47.6 6/	37.6 7/13.	34.0 0/	41.1 1/	44.4 0/	37.4 2/	45.6 6/	33.6 5/	38.2 6/
1 (18-24)	15.1	18.6	14.3	14.3	17.4	97	12.1	13.5	14.1	12.9	15.8	9.89	13.2
2 (25-34)	4	1	6	0	5	22.0	8	9	7	4	7	16.7	0
3 (35-44)	16.8	11.3	18.2	15.3	10.7	%	28.2	16.0	11.5	21.0	11.7	%	18.8
4 (45-54)	%	%	%	%	%	27.3	%	%	%	%	%	41.3	%
5 (55+)	23.4	17.1	22.0	20.9	17.3	19.6	30.2	19.3	16.2	25.3	18.1	26.9	25.3
	20.2	16.5	20.2	20.1	18.2	13.5	18.3	23.4	19.6	20.8	17.4	11.9	21.7
	16.3	18.4	17.0	17.7	18.2	17.6	11.6	17.7	20.7	14.5	17.	3.2	16.8
	23.3	36.7	22.6	26.0	35.6		11.7	23.6	32.0	18.4	35.1		17.4
Gender	.49/	.52/	.52/	.52/	.50/	.53/	.51/	.49/	.51/	.49/	.51/	.27/	.50/
	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	.45	.50
0 (Male)	52.0	48.1	48.1	47.8	49.7	47.3	49.2	50.9	49.5	51.4	48.7	72.9	50.2
1 (Female)	%	%	%	%	%	%	%	%	%	%	%	%	%
	48.0	51.2	51.3	52.2	50.0	52.7	50.8	49.1	50.5	48.6	50.9	27.1	49.8
Location (% in category)	2.49/	1.96/	2.78/	2.87/	2.03/	2.26/	2.61/	2.88/	2.79/	2.66/	2.04/	2.47/	2.56/
1 (Rural)	.70	.73	.52	.43	.71	.71	.66	.36	.53	.66	.59	.77	.65
2 (Suburban)	12.1	28.6	5.0%	3.5%	24.0	15.7	9.6%	1.1%	5.9%	10.6	15.7	17.2	8.4%
3 (Urban)	%	47.3	12.5	6.3	%	%	19.9	10.0	8.9	%	%	%	27.7
	26.8	24.1	82.5	90.2	49.1	42.8	70.5	88.9	85.2	13.3	65.1	18.2	63.9
	61.1				26.9	41.5				76.1	19.2	64.6	
SES ladder	5.21/	5.67/	4.75/	5.35/	5.92/	5.63/	5.77/	5.18/	5.89/	4.64/	5.70/	3.53/	4.49/
	1.92	1.97	1.53	1.76	1.90	1.87	1.85	1.61	1.84	1.61	2.02	1.82	1.63
Education (Z-score) b	.00/	.00/	.00/	.00/	.00/	.00/	.00/	.00/	.00/	.00/	.00/	.00/	.00/
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Environmental social norms (descriptive)	40.6 %/	39.6 1%/	33.1 7%/	33.9 8%/	42.7 1%/	33.7 4%/	43.1 9%/	42.4 0%/	35.8 8%/	46.4 6%/	45.8 8%/	47.7 3%/	42.3 2%/

| 22.49 | 21.01 | 19.44 | 21.69 | 21.84 | 21.23 | 22.29 | 23.75 | 21.62 | 21.50 | 22.53 | 23.56 | 22.48 |

Table 4

Principal Components Analyses

A. Media Exposure: Environmental Content

How learn about issues that affect environment?	**Combined**	**Distinct**	
	Env_Cont	**SM**	**Trad**
Q37_01 print or online pubs	.244	.104	**.688**
Q37_05 Facebook a	.697	**.703**	.046
Q37_06 Instagram a	.719	**.742**	-.033
Q37_07 Twitter a	.641	**.647**	.035
Q37_08 YouTube a	.709	**.693**	.148
Q37_10 WhatsApp	.647	**.659**	.006
Q37_12 books	.299	.159	**.692**
Eigenvalues	2.48	2.48	1.38
Variance Explained (%)	31.03	31.03	17.30
Cronbach's α	.66	.72	.44

Note: Principal components analysis. Varimax rotation for multiple dimensions.
a = Not asked in China
Removed Q37_03 "Organization websites", Q37_04 "Family or friends", Q37_09 "Radio", Q37_11 "Weibo [only China]
Variable is not treated as a mean scale; the count (sum) of the five activities

B. Mediated Civic Activism

Past 12 months, participated in the following activities?	**MCA**
S7_01 Contacted a politician	.510
S7_02 Wrote a letter to the editor	.659
S7_03 Called into a live news broadcast	.553
S7_05 Wrote an article for a publication	.626
S7_06 Posted to online forum or blog	.542
Eigenvalue	1.69
Variance Explained (%)	33.70
Cronbach's α	.47

Note: Principal component analysis
Removed S7_4 "Signed a Petition"
Variable is not treated as a mean scale; the count (sum) of the five activities.

C. Environmental Attitudes: Combined, Concern, and Values

Q3: Agree/disagree with the following statements Q13: How concerned personally with each of following global issues?	Combined	Distinct	
	EA	EC	VN
Q3_2 Conserving natural resources is important for the country's economy	.684	.264	**.734**
Q3_3 Conserving nature is a reflection of my core moral beliefs and convictions	.651	.219	**.733**
Q3_4 Nature is important to me, to who I am as a person	.681	.239	**.757**
Q3_5 Protecting nature is important for people's health	.699	.279	**.739**
Q3_6 Being in/seeing nature brings people pleasure or satisfaction	.653	.216	**.741**
Q13_1 HabitatLoss	.705	**.733**	.237
Q13_2 PlasticPollution	.723	**.739**	.257
Q13_3 GlobalClimateChange	.718	**.753**	.233
Q13_4 SpeciesAtRiskOfExtinction	.710	**.719**	.260
Q13_5 AirPollution	.750	**.771**	.260
Q13_7 LackOfCleanDrinkingWater	.673	**.718**	.205
Eigenvalues	5.33	5.33	1.35
Variance Explained (%)	48.42	48.42	12.26
Cronbach's α	.89	.87	.84

Note: Principal components analysis
Varimax rotation for multiple dimensions

E. Efficacy: Combined, Self-, and Collective Efficacy

Q14: Confidence YOU AS AN INDIVIDUAL can attain following in next 10 years Q15: Confidence YOUR COUNTRY can attain following in next 10 years	Combined	Distinct	
	Efficacy	Collective	Self
Q14_1 Protect habitats	.765	.248	**.847**
Q14_2 Reduce plastic pollution in our oceans	.718	.263	**.763**
Q14_3 Reduce use of fossil fuels (e.g., petroleum, natural gas, coal)	.716	.258	**.766**
Q14_4 Save animals at risk of extinction	.752	.260	**.815**
Q15_1 Protect habitats	.808	**.837**	.294
Q15_2 Reduce plastic pollution in our oceans	.773	**.828**	.254
Q15_3 Reduce use of fossil fuels (e.g., petroleum, natural gas, coal)	.743	**.812**	.226
Q15_4 Save animals at risk of extinction	.801	**.821**	.301
Eigenvalues	4.62	4.62	1.21
Variance Explained (%)	57.77	57.77	72.83
Cronbach's α	.90	.86	.89

Note: Principal components analysis

Varimax rotation for multiple dimensions

F. Pro-Environmental Behaviors

How frequently personally engaged in behaviors?	Combined	Distinct	
	PEB	**Public**	**Private**
Q17_1 Recycle	.557	.121	**.819**
Q17_2 Avoid products with ingredients that are bad for the environment	.778	**.704**	.347
Q17_3 Use your own reusable shopping bags	.564	.128	**.821**
Q17_5 Talk to friends or family about an environmental issue	.791	**.833**	.178
Q17_6 Used social media to share information about an environmental issue	.696	**.862**	-.035
Eigenvalues	2.34	2.34	1.12
Variance Explained (%)	46.86	46.86	22.36
Cronbach's α	.71	.75	.58

Note: Principal components analysis
Varimax rotation for multiple dimensions

Table 5

Overall Bivariate Correlations

Pearson Correlation (1-tailed)	News media	Environmental media	Mediated civic activism	Valuing nature	Environmental concern	Environmental attitudes	Self-efficacy	Collective efficacy	Efficacy	Private PEB	Public PEB	PEB
News media	--											
Environmental media	.279***	--										
Mediated civic activism	.269***	.202***	--									
Valuing nature	.185***	.243***	.046***	--								
Environmental concern	.149***	.260***	.006	.591***	--							
Environmental attitude	.184***	.282***	.027**	.862***	.918***	--						
Self-efficacy	.133***	.173***	.032***	.227***	.219***	.249***	--					
Collective efficacy	.054***	.078***	.006	.130***	.091***	.121***	.586***	--				
Efficacy	.106***	.142***	.022**	.201***	.175***	.209***	.895***	.886***	--			
Private PEB	.038***	.056***	.070***	.245***	.243***	.273***	.125***	.079***	.115***	--		
Public PEB	.312***	.334***	.198***	.386***	.363***	.418***	.299***	.133***	.244***	.322***	--	
PEB	.249***	.274***	.180***	.402***	.384***	.439***	.281***	.136***	.235***	.714***	.893***	--

$* p < .05, ** p < .01, *** p < .001$
N = 12,000

Table 6

Hierarchical Regressions of Media Subcomponents on Model Variables

	EA combined	EA combined	PEB Combined
	β	*β*	*β*
Media			
News Media	.121***	.116***	--
Env Media	.257***	--	--
Env Media Trad	--	.230***	--
Env Media SM	--	.081***	--
Med Civic Act	--	--	.150***
Adj R2	.091	.093	.032
F (df1,df2)	603.604***	412.149***	401.179***
	(2, 11,974)	(3, 11,973)	(1, 11,975)
Demographics			
Age	.038***	.018*	.034***
Gender	.100***	.098***	.067***
Location	.079***	.084***	.080***
SES ladder	.038***	.025**	-.158***
Education (Z score)	-.001	-.006	.038***
Environmental social norms (descriptive)	-.005	.002	.163***
Adj R2	.109	.110	.106
F (df1,df2)	184.491***	165.403***	204.626***
	(8, 11,968)	(9, 11,967)	(1, 11,969)

$* p < .05, ** p < .01, *** p < .001$
N = 12,000

Table 7

Overall Hierarchical Regressions for General (combined) Model and (Mis)match Models

Model Variables	General	Match 1: Values/Self/Private	Match 2: Concern/Collective/Public	Mismatch 1: Values/Self/Public	Mismatch 2: Values/Collective/Private	Mismatch 3: Values/Collective/Public	Mismatch 4: Concern/Self/Private	Mismatch 5: Concern/Self/Public	Mismatch 6: Concern/Collective/Private
	β	β	β	β	β	β	β	β	β
Country									
Mex	.097***	-.002	.152***	.145***	.012	.164***	-.012	.133***	.001
Bra	.058***	-.051***	.121***	.117***	-.037**	.138***	-.065***	.102***	-.052***
UK	.150***	.261***	.034**	.044***	.260***	.042***	.254***	.036***	.253***
SA	.063***	-.008	.100***	.101***	-.001	.112***	-.017	.091***	-.011
Ken	.012	-.070***	.075***	.071***	-.067***	.077***	-.070***	.070***	-.067***
Chi	.168***	.028*	.216***	.194***	.037**	.209***	.037**	.202***	.045***
SK	.080***	.045***	.072***	.095***	.051***	.104***	.017	.065***	.021
Ind	.154***	-.026*	.214***	.228***	-.024*	.229***	-.039***	.214***	-.039**
Aus	.127***	.219***	.030**	.044***	.220***	.045***	.206***	.029**	.206***
UAE	.119***	-.024*	.178***	.169***	-.021	.174***	-.019	.174***	-.017
Indo	.008	-.169***	.133***	.122***	-.160***	.134***	-.168***	.122***	-.160***

Adj R²	.059	.121	.140	.140	.121	.140	.121	.140	.121
F(11,11965)	69.003***	150.418***	178.937***	178.937***	150.418***	178.937***	150.418***	178.937***	150.418***
Attitude & Efficacy									
Valuing nature	--	.257***	--	.269***	.268***	.289***	--	--	--
Environmental concern	--	--	.290***	--	--	--	.252***	.271***	.262***
Environmental attitudes	.384***	--	--	--	--	--	--	--	--
Self-efficacy	--	.096***	--	.140***	--	--	.094***	.137***	--
Collective efficacy	--	--	.041***	--	.032***	.035***	--	--	.038***
Efficacy	.095***	--	--	--	--	--	--	--	--
Inter EA*EFF a	-.004	-.011	-.020**	-.022**	-.021*	-.011	.004	-.015*	-.018*
Adj R²	.268	.222	.259	.289	.212	.262	.215	.285	.205
F(14, 11962)	313.729***	244.909***	299.319***	348.832***	231.298***	304.059***	234.867***	341.142***	222.059***
Media									
News media	.102***	.045***	.121***	.114***	.046***	.115***	.050***	.119***	.052***
Environmental media	.110***	.048***	.145***	.144***	.055***	.155***	.042***	.136***	.048***
Adj R²	.305	.228	.316	.340	.219	.318	.222	.337	.214

F(16,11960)	329.090***	222.064***	347.129***	386.113***	211.488***	350.108***	214.208***	380.860***	204.315***
Civic Activism									
Mediated civic activism	.091***	.036***	.096***	.090***	.035***	.088***	.042***	.097***	.042***
Adj R²	.313	.229	.326	.348	.221	.327	.223	.347	.215
F(17,11959)	322.562***	210.363***	342.078***	377.681***	200.369***	342.783***	203.489***	374.736***	194.180***
Demographics									
Age	.029***	.109***	-.025**	-.028***	.107***	-.031***	.114***	-.022**	.113***
Gender	.055***	.064***	.042***	.048***	.063***	.046***	.061***	.044***	.060***
Location	-.001	.025**	-.009	-.013	.024**	-.012	.029**	-.009	.028**
SES ladder	-.108***	-.038***	-.121***	-.106***	-.041***	-.112***	-.046***	-.115***	-.050***
Education (Z-score)	.013	.017*	.007	.010	.017*	.010	.016	.008	.015
Environmental social norms (descriptive)	.127***	.090***	.129***	.102***	.103***	.123***	.096***	.108***	.108***
Adj R²	.345	.253	.360	.373	.247	.358	.250	.374	.244
F(23,11953)	275.231***	177.757***	293.444***	311.005***	171.716***	290.874***	174.934***	311.867***	169.362***

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

a. For the (mis)match models, the appropriate environmental attitudes and efficacy subdimensions were used to build the interaction term

Table 8

Overall Hierarchical Regressions for Exploratory Models

Model Variables	1: EAIndex/Self/ Private	2: EAIndex/Coll ective/Private	3: EAIndex/Self/ Public	4: EAIndex/Coll ective/Public
	β	β	β	β
Country				
Mex	-.017	-.005	.129***	.146***
Bra	-.064***	-.052***	.104***	.121***
UK	.256***	.255***	.039***	.036***
SA	-.020	-.015	.088***	.096***
Ken	-.076***	-.074***	.064***	.068***
Chi	.032**	.038**	.197***	.210***
SK	.033**	.036**	.082***	.088***
Ind	-.030**	-.030**	.223***	.223***
Aus	.211***	.211***	.035***	.036***
UAE	-.021	-.019	.172***	.176***
Indo	-.174***	-.168***	.115***	.125***
Adj R²	.121	.121	.140	.140
F(11,11965)	150.418***	150.418***	178.937***	178.937***
Attitude & Efficacy				
Valuing nature	--	--	--	--
Environmental concern	--	--	--	--
Environmental attitudes	.298***	.306***	.316***	.336***
Self-efficacy	.082***	--	.125***	--

Collective efficacy	--	.029**	--	.031***
Efficacy	--	--	--	--
Inter EA*EFF	.010	-.010	-.007	-.005
Adj R²	.238	.230	.311	.289
F(14,11962)	267.177***	255.885***	387.142***	347.865***

Media

News media	.041***	.042***	.109***	.110***
Environmental media	.031**	.036***	.124***	.132***
Adj R²	.243	.235	.356	.338
F(16,11960)	239.880***	230.951***	414.367***	382.467***

Civic Activism

Mediated civic activism	.041***	.041***	.096***	.095***
Adj R²	.245	.237	.366	.347
F(17,11959)	227.698***	219.303***	407.012***	376.144***

Demographics

Age	.108***	.107***	-.029***	-.032***
Gender	.057***	.056***	.039***	.037***
Location	.024**	.023*	-.015	-.014
SES ladder	-.046***	-.048***	-.114***	-.120***
Education (Z-score)	.016	.015	.008	.008
Environmental social norms (descriptive)	.094***	.105***	.106***	.126***
Adj R²	.268	.263	.392	.380
F(23,11953)	191.851***	186.933***	337.132***	320.168***

Table 9

General Hierarchical Regressions by Country

Model Variables	US	Mex	Bra	UK	SA	Ken	Chi	SK	Ind	Aus	UAE	Indo
	β	β	β	β	β	β	β	β	β	β	β	β
Attitude & Efficacy												
Environmental attitudes	.428***	.302**	.241***	.472***	.300***	.171***	.372***	.401***	.517***	.464***	.532***	.272***
Efficacy	.106***	.169***	.167***	.082**	.155***	.055	.052	.125***	.079**	.066*	.031	.159***
Inter EA*EFF	.018	-.037	-.028	.000	-.091**	-.021	-.020	.055*	.001	.010	.023	-.018
Adj R²	.310	.183	.168	.340	.200	.035	.235	.273	.280	.331	.307	.173
F(14, 11962)	149.154***	75.009***	68.442***	172.060***	84.509***	13.076***	103.488***	126.224***	130.553***	165.059***	148.399***	70.858***
Media												
News media	.097***	.153***	.085**	.034	.161***	0.048	.126***	.080**	.114***	.062*	.100***	.136***
Environmental media	.102***	.093**	.124***	.163***	.090**	.094**	.145***	.102***	.110***	.162***	.022	.126***
Adj R²	.353	.235	.207	.384	.251	.038	.297	.307	.320	.387	.337	.246
F(16,11960)	109.099***	62.174***	53.180***	125.187***	68.089***	8.962***	85.380***	89.560***	95.074***	126.693***	102.584***	66.214***
Civic Activism												

Mediated civic activism	.088***	.078**	.084**	.124***	.084**	.014	.116***	.103***	.085**	.128***	.062*	.089**
Adj R²	.360	.241	.213	.398	.258	.038	.317	.321	.328	.401	.343	.257
F(17,11959)	93.805***	53.534***	46.059***	110.637***	58.766***	7.548***	78.417***	79.859***	82.272***	111.876***	87.847***	58.474***
Demographics												
Age	-.007	-.006	.119***	.006	.058*	.041	.034	.046	-.123***	.029	.032	.044
Gender	.080**	.107***	.044	.096***	.057*	.008	.062*	.038	-.034	.066**	.021	.049
Location	.046	-.012	.056*	.014	-.037	-.146***	.074**	.090***	-.095**	-.053*	.001	.051
SES ladder	-.096***	-.084**	-.038	-.079**	-.100**	-.040	-.190***	0.099***	-.136***	-.102***	-.185***	-.095**
Education	.061*	.016	.060*	.042	-.015	-.087*	.039	-.038	-.089**	.031	.029	.121***
Environmental social norms (descriptive)	.173***	.116***	.153***	.075**	.140***	.079*	.095***	.172***	.104***	.115***	.162***	.131***
Adj R²	.410	.272	.262	.420	.290	.072	.378	.368	.373	.429	.407	.311
F(23,11953)	58.195***	31.934***	30.559***	61.199***	35.083***	7.482***	51.573***	49.572***	50.563***	63.366***	58.057***	38.589***

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

Table 10

Mismatch 5 (Concern/Self/Public) Hierarchical Regressions by Country

Model Variables	US	Mex	Bra	UK	SA	Ken	Chi	SK	Ind	Aus	UAE	Indo
	β	β	β	β	β	β	β	β	B	B	β	β
Attitude & Efficacy												
Environmental concern	.303***	.202***	.224***	.341***	.228***	.059	.251***	.221***	.440***	.310***	.456***	.257***
Self-efficacy	.183***	.189***	.180***	.165***	.199***	.130***	.062*	.155***	.088**	.132***	.062*	.169***
Inter EA*EFF a	.016	-.013	-.008	-.034	-.068*	-.074*	-.047	.045	-.034	.011	.013	-.010
Adj R²	.254	.125	.156	.253	.165	.049	.125	.146	.211	.220	.246	.177
F(14, 11962)	112.951***	48.397***	62.456***	133.460***	66.711***	18.175***	48.447***	57.757***	89.822***	94.418***	109.715***	72.837***
Media												
News media	.171***	.167***	.057	.08***	.171***	-.042	.193***	.110***	.098***	.072*	.109***	.156***
Environmental media	.129***	.135***	.156***	.166***	.155***	.102**	.111***	.136***	.153***	.202***	.029	.180***
Adj R²	.340	.206	.203	.334	.243	.054	.225	.209	.254	.324	.282	.271
F(16,11960)	102.854***	52.608***	51.785***	99.423***	65.113***	12.339***	58.938***	53.862***	69.060***	96.573***	79.281***	75.416***
Civic Activism												

Mediated civic activism	.108***	.111***	.106***	.131***	.087**	.030	.148***	.131***	.099***	.159***	.051	.057*
Adj R²	.348	.218	.212	.349	.249	.053	.257	.231	.265	.352	.285	.276
F(17,11959)	89.000***	47.099***	45.828***	88.342***	56.323***	10.275***	58.662***	50.942***	61.088***	90.948***	67.421***	64.487***

Demographics

Age	-.106***	-.015	.096***	-.093***	.020	.006	.003	.019	-.128***	-.073**	.027	.024
Gender	.063*	.109***	.045	.099***	.066*	.004	.034	-.017	-.026	.051	.000	.027
Location	.011	-.006	.041	.035	-.051	-.173***	.031	.058*	-.121***	-.045	.040	.008
SES ladder	-.084**	-.092**	-.044	-.112***	-.087**	-.066*	-.263***	-.130***	-.092**	-.102***	-.175***	-.119***
Education	.025	.027	.066*	.039	-.004	-.083*	.020	-.050	-.113***	.061*	.047	.077**
Environmental social norms (descriptive)	.144***	.093**	.165***	.061*	.112***	.083**	.085**	.154***	.034	.116***	.159***	.155***
Adj R²	.388	.247	.261	.384	.274	.093	.340	.273	.303	.391	.343	.324
F(23,11953)	53.297***	28.149***	30.413***	52.833***	32.478***	9.548**	43.798***	32.299***	37.127***	54.232***	44.525***	40.939***

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

a. The interaction term uses the product of the centered variables Concern (for Environmental Attitudes) and Self (for Efficacy)

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Table 11

2017 Freedom House Press Freedom Scores by Country

Country	Press Freedom Score	Status
United States	23	Free
Mexico	64	Not Free
Brazil	47	Partly Free
United Kingdom	25	Free
South Africa	38	Partly Free
Kenya	58	Partly Free
China	87	Not Free
South Korea	34	Partly Free
India	43	Partly Free
Australia	22	Free
United Arab Emirates	78	Not Free
Indonesia	49	Partly Free

Table 12

Significance Tests of Hypotheses

Hypotheses	Result
H1a	$\sqrt{}$***
H1b	$\sqrt{}$***
H1c	$\sqrt{}$***
H2.0	$\sqrt{}$***
H3.0	$\sqrt{}$***
H4.0	--
H2a	$\sqrt{}$***
H2b	$\sqrt{}$***
H2c	$\sqrt{}$***
H2d	$\sqrt{}$***
H3a	$\sqrt{}$***
H3b	$\sqrt{}$***
H3c	$\sqrt{}$***
H3d	$\sqrt{}$***
H4a	--
H4b	--
H4c	--
H4d	--
H4e	--
H4f	--
H4g	--
H4h	--
H5a	$\sqrt{}$
H5b	$\sqrt{}$
H5c	$\sqrt{}$
H5d	$\sqrt{}$
H5e	$\sqrt{}$
H5f	$\sqrt{}$
H5g	$\sqrt{}$
H5h	$\sqrt{}$
H6	--
H7	--

* $p < .05$, ** $p < .01$, *** $p < .001$; significance levels not relevant for H5a-h
Note: $\sqrt{}$ supported, -- not supported

Table 13

World Population Review Developed Countries List 2022

Country	Human Development Index	Status
United States	.926	Developed
Mexico	.779	Developing
Brazil	.765	Developing
United Kingdom	.932	Developed
South Africa	.709	Developing
Kenya	.601	Developing
China	.761	Developing
South Korea	.916	Developed
India	.645	Developing
Australia	.944	Developed
United Arab Emirates	.890	Developed
Indonesia	.718	Developing

Figure 1

Two Versions of General Model

Direct Effects
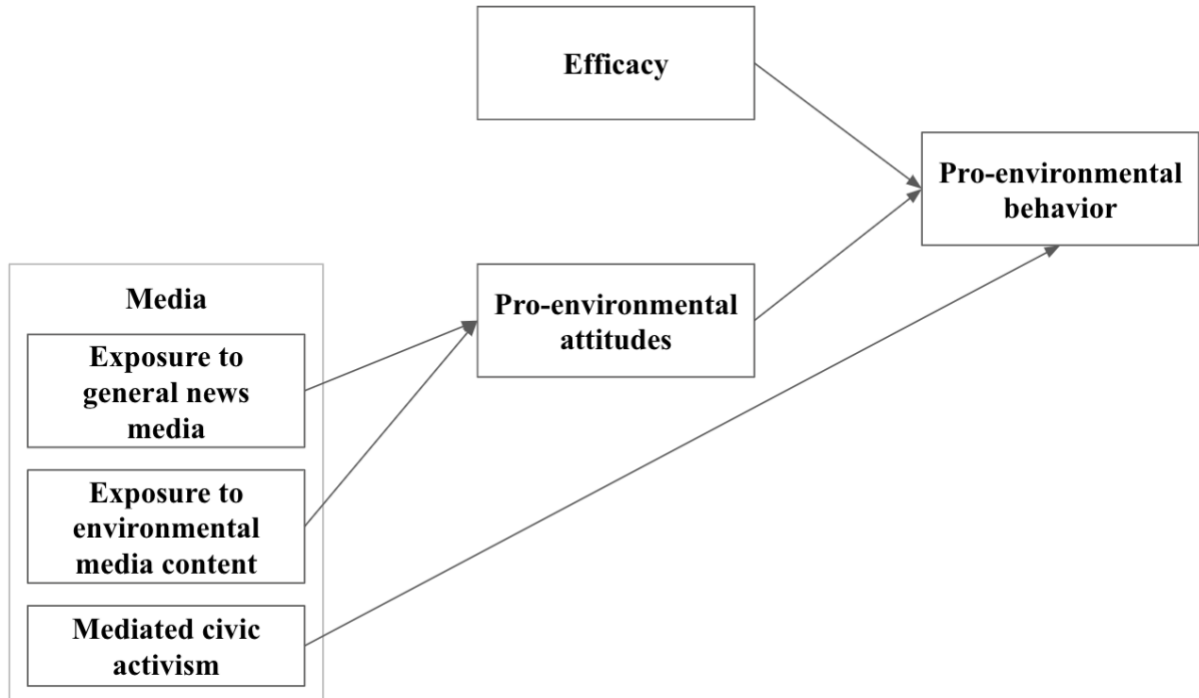
Moderating Effects
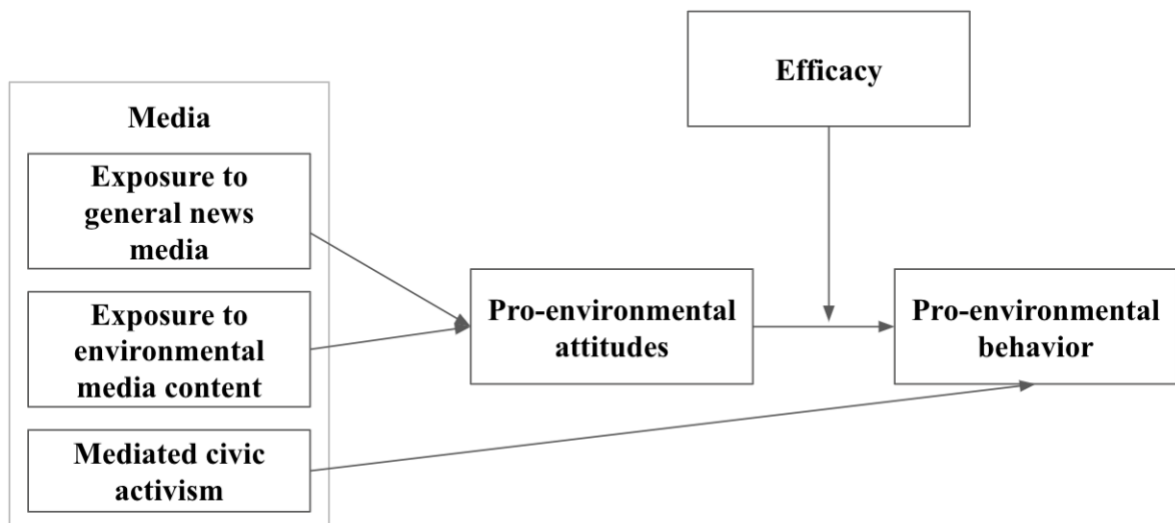
Figure 2

Relationship Between Countries' Human Development Index Score and the Total Variance

Explained in PEB by the General Model
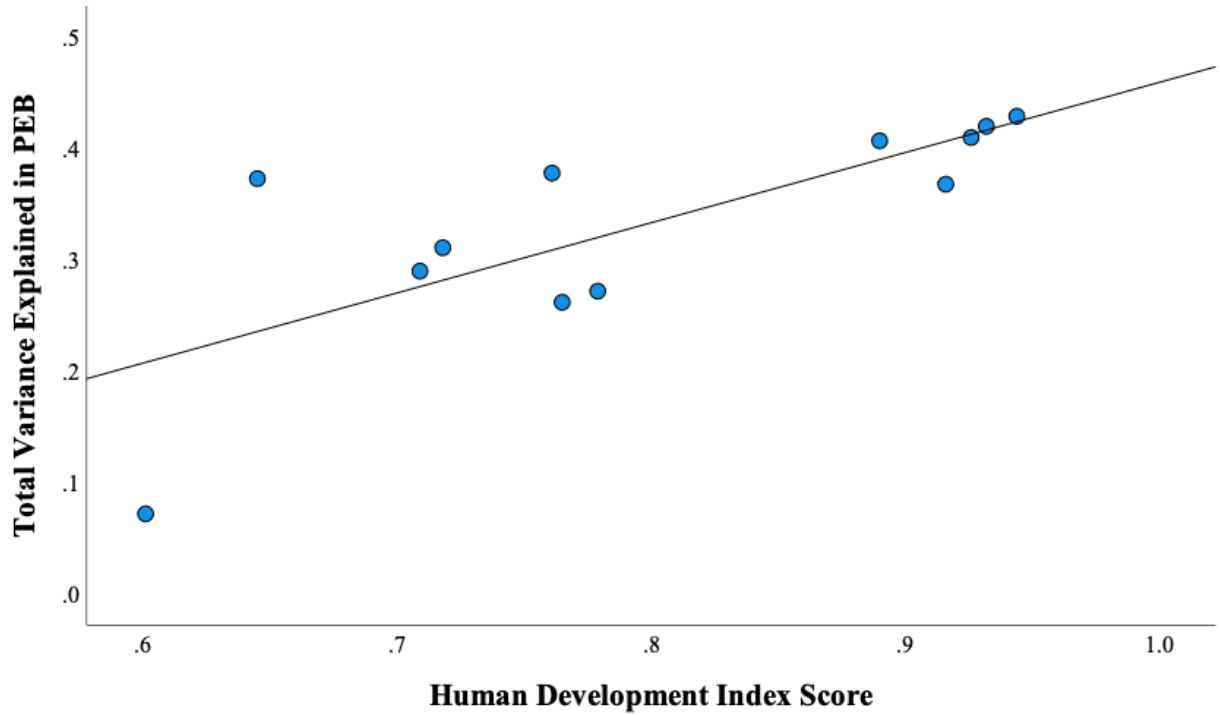
Note. $r = .746, p = .005$

Figure 3

Relationship Between Countries' Press Freedom Score and the Total Variance Explained in

PEB by the General Model
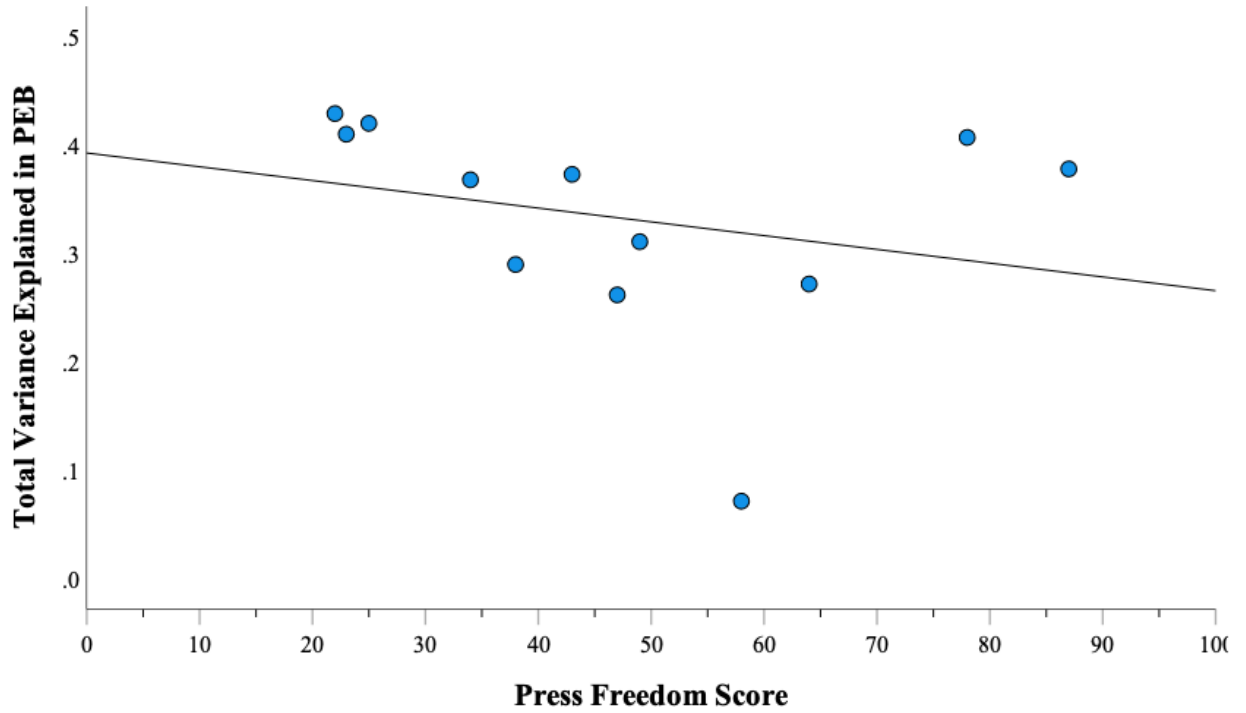
Note. $r = -.266, p > .1$

Appendix

Relevant References and Their Sample, Topic, Model Role of Efficacy, Type of Efficacy, Type of PEB, and Significance

Source	Sample	Topic	Efficacy Relationship Tests				Type of PEB				Type of Efficacy			Significant?			
			Direct	Indirect	Mediate	Moderate	Private	Public	Combined	Doesn't specify	Self-efficacy	Collective Efficacy	Combined	Direct	Indirect	Mediate	Moderate
Abraham et al. (2015)	Jakarta, Indonesia: 205 undergraduate students	Environment	x						x		x			yes			
Anker et al. (2010)	US: 425 undergraduate communication students	Prosocial organ/blood donations			x	x	x				x					yes	no
Axelrod and Lehmen (1993)	Canada: 259 undergrad students from UBC and 105 community adults, most of them workers at the	Environment	x		x				x		x			yes		yes	

Study	Sample	Context															
	university																
Bamberg and Möser (2007)	46 studies with 57 independent samples published since 1995	Environment: Meta-analysis	x		as behavioral control, esp for those with higher env. Concern]					x	PBC			yes	yes ; as beh control, strong influence on intentions and behavior for those with higher env concern		
Barth et al. (2016)	Germany: 548 adults	Adoption of electric vehicles	x				x					x		yes			
Berger and Corbin (1992)	Canada: 1521 telephone interviews	Environment				x		x			PCE			yes			
Bozorgparvar (2018)	Iran: 140 farmers	Intention to use renewable energies	x				Adoption of renewable energy				x			yes			
Chen (2015)	Taiwan: N=707	Environment	x					x			x	x		yes; collective efficac			

													y better predictor		
Doherty and Webler (2006)	US: N=702	Climate Change	x		x			x		x	x		yes		yes	
Gan and Gal (2018)	Israel: 80 students from college sustainability course	Environmental Education	x (predicted, not as influence itself]				x	x		x			yes; by skills			
Hamann and Reese (2020)	Germany: Study 1: 259 university students; Study 2: 1,143 German adults	Environment	x				x	x		x	x		yes; self-efficacy predicted private PEBs, but collective efficacy found mixed results. Study 1: positive correlation with			

													public intention; Study 2: collective efficacy negatively predicted public and activist PEB, self-efficacy positively correlated with public PEB			
Hart and Feldman (2016)	US: 1,426 participants from University of Michigan	Political participation in environmental issues	x					x			x			yes			
Heeren et al. (2016)	US: 20,236 Ohio State students	Environment	x						x (10 items, 1 was public)		x			yes			

Study	Sample	Focus															
Homburg and Stolberg (2006)	Germany: N=280 incidental sample			x (through coping appraisal)					x			x	x			yes		
Huang (2016)	Taiwan: N=1074 telephone interviews	Environment	x	x (through media use)					x			x			yes	yes		
Jugert et al. (2016)	Germany/Australia: Study 1: N=646; Study 2: 72 German university students; Study 3: 53 Australian university students; Study 4: 205 German community members	Environment	x				x					x	x		yes; collective efficacy elevated pro-environmental intentions only when self-efficacy was salient but not when the possibility of effective person			

						x	x (Purch				PCE			al action was precluded. This supports the notion of self-efficacy as a necessary ingredient for collective efficacy perceptions to drive people's action intentions in large-scale environmental crises.			
Kim (2011)	Korea (N=261	Environment				x	x (Purch				PCE						no

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	undergraduate students)					ase behaviors)							
Kim et al. (2013)	US (N=189) and Korea (144)	Environment	x			x			x			yes	
Lam (2006)	Taiwan: Study 1 (N=212); Study 2 (N=300)	Intention to install EV-friendly toilet	x			x			PBC study 1; response efficacy study 2	x collective response efficacy		yes; with self-efficacy study 2. Collective efficacy was not significant in study 1 but was in study 2	
Lee and Holden (1999)	US: N=78 business students	Environmental consumer behaviors	x		x		x		PCE			yes		yes
Lee et al. (2014)	South Korea:N=416)	Environment, PCE	x			x	x		PCE			yes	

Study	Sample	Topic															
Lubell (2002)	US: 2 surveys. 1: 1993 GSS of a national sample of 1,606 US citizens and 2: a survey of residents in 5 towns N=460	Environmental activism	x					x				x	x		yes; significant relationship with personal efficacy but not citizen efficacy			
Matley and Davies (2018)	Predominantly UK, N=249 snowball sampling	Alcohol consumption			x					Alcohol consumption	Alcohol self-efficacy					yes		
Meinhold and Malkus (2005)	US; 848 adolescents	Environment	x			x			x		x			yes			no for total sample, but yes for females
Morton et al. (2011)	N=120 university students	Climate change and uncertainty			x				x		x				yes: effects of uncertainty on intention to act mediated by collective		

Study	Sample	Topic											efficacy	
Oh et al. (2020)	US: N=76 college students	Environment: manipulated video condition (360 degree video vs unidirectional video) on PEBs			x		x		x						yes
Oreg and Katz-Gerro (2006)	27 countries, 31,042 respondents	Environment	x				x					x	yes		
Piyapong (2020)	Thailand: N=337 university students	Environment				x	x		x				no direct effect on environmental activism, nonactivist public behavior, or private PEBs		
Rees and Bamberg (2014)	Germany: N=538 university	Climate change	x				x			x			yes		

Study	Country / N	Topic	1	2	3	4	5	6	7	8	9	10	11	yes	notes
	students and their network														
Rees and Junge (2017)	Germany: N=165	Environment and Task Difficulty					x				x	x		yes	yes: task difficulty --> collective efficacy --> self-efficacy --> PEB intentions
Rice et al. (1996)	Thailand: N=455	Environment	x						x		x (modified PCE)			yes	
Roser-Renouf et al. (2014)	US: N=50,000 nationally representative survey	Climate Change	x		x			x			x	x		yes	yes
Sharon et al. (2020)	US: 300 nursing students	Sexuality Education	x		x					Intention to participate in sex education	x			yes	yes
Straughan and	US: 235 universit	Environment:	x				Consumer				PCE			yes	

Roberts (1999)	y students	Consumer behavior				behavior								
Tabernero and Hernandez (2011)	Spain: N=1,501	Environment	x			x			x			yes: also mediated through intrinsic motivation		
Taylor and Todd (1995)	Canada: N=761	Waste behavior	x			x			PBC			yes		
Thogersen and Gronhoj (2010)	Denmark: N=312 households	Electricity saving behavior	x			x			x			yes		
Walton and Austin (2011)	US: N=429 randomly dialed residents of Kentucky	Environment and Recycling	x		x	x			x			yes	yes	
Wang (2017)	31 countries, 39,496 respondents	Environment	x			x			x			yes		
Wang (2018)	US: N=567 consumers	Climate Change	x				x			x		yes		

Author	Sample	Outcome														
Wang (2019)	China: N=394 farmers	Environment	x							x				yes			
Wu and Mweemba (2010)	Zambia N=102 households	Environment	x		x				x		x			yes		yes	
Yao and Enright (2020)	US: N=207	Prosocial Behavior	x		x					x	x			yes			