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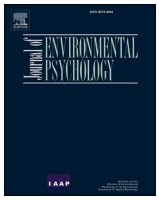

Emotions and policy information predicting water-quality policy support☆

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ABSTRACT

The public acknowledges the importance of water quality, and threats to water quality can provoke strong emotional responses. Despite this, the public often resists policies protecting water quality. Research with 349 US residents demonstrated that (1) emotions about specific water policies were more predictive of policy support than emotions about water quality and (2) hope about water policies was a particularly strong predictor of water policy support. In both between-person and within-person analyses, water-policy hope was a stronger predictor of water-policy support than water-policy anxiety, anger, and neutral affect–although these other emotions were related to water-policy support. These findings among water-policy emotions replicated results from a Pilot study with 148 US undergraduate students. The main study also demonstrated that water-policy support increased when policy descriptions explained how policies would improve water quality via hydro systems, and it did so by increasing feelings of water-policy hope. This research suggests that a full range of affective reactions to water policy and water quality should be considered when motivating support for policies protecting water quality.

1. Introduction

Water quality has been among the US public's top environmental concerns for decades (Brenan, 2021). When water quality is threatened, strong emotions emerge. For example, Michigan residents were afraid and angry when their state's decision to change water sources resulted in exposure to lead in poor communities (Cuthbertson et al., 2016). Such emotions can prompt public demand for solutions. Public outcry in the United States about polluted waters contributed to the passage of the US Clean Water Act in 1972 and the Safe Drinking Water Act in 1974 (Adler, 2002; Denekas, 2018; Keiser & Shapiro, 2019). Even though water quality in the United States (Brenan, 2021) improved over the subsequent 50 years (Keiser & Shapiro, 2019), threats to water quality remain and are accentuated by climate change (Gleick, 2010). A recent report indicated that half of US rivers, streams, creeks, lakes, ponds, and reservoirs are impaired (Kelderman et al., 2022). Some threats occur from violating regulatory standards (Allaire et al., 2018), while others arise because US federal acts do not regulate non-point sources of pollution (e.g., farming practices, infrastructure, and population changes; Keiser & Shapiro, 2019). As they did 50 years ago, the public's emotions about these issues offer an avenue towards understanding their motivation for supporting water policies.

This research examines how the public's affective reactions to both water quality and water policies relate to support for policies mitigating water-quality problems. We examine four emotions: anxiety, anger, hope, and neutrality.[1] We assess emotions about water quality and water policies, distinguishing emotions *about problems* from emotions *about solutions,* respectively. We test whether (a) people expressing greater levels of particular emotions are more or less likely to support policies (between-person effects) and (b) policies associated with relatively stronger levels of particular emotions (compared to other policies rated by the same person) are supported more than other policies (within-person effects). Finally, because knowledge about water policies may influence emotions about policies, we test whether informing people about how the policies improve water quality will alter their emotions about the policies and, thereby, their support for and preferences among the policies.

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[1] As noted below in more detail, neutrality shares some commonalities with emotions but may not fit classical definitions of emotions and, as such, might better be described as an affective state Gasper (2023). Yet, because of their commonalities and the applicability of emotion theories to our predictions about anger, anxiety, hope, and neutral affect, when we refer to emotions, we are including neutral affect.

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1.1. Emotions and policy support

Emotions may help explain public motivation to support a policy. In psychology and affective science, affect is defined as a mental representation of an internal state, often represented by different emotions (Barrett & Bliss-Moreau, 2009). Emotions are 1) subjective, 2) reflect appraisals of a target (e.g., water quality or water policies), 3) suggest action tendencies, and 4) are revealed in physical experiences (e.g., physiological responses, facial responses; Chadwick, 2015; Lazarus, 2001). Beginning with early comparisons between fear and anger, researchers studying emotions, judgment, and decision-making have recognized the theoretical and practical value of studying distinct emotions (Angie et al., 2011). Such research has expanded to study other distinct emotions, such as hope or guilt, each showing unique characteristics and triggers (Harmon-Jones et al., 2016). Research on environmental problems and policy support could benefit from consideration of distinct emotions and different targets of these emotions – specifically differentiating emotions about environmental problems from emotions about environmental policies.

Researchers have examined beliefs (often called attitudes) about water quality and the social and economic valuation of water (e.g., willingness to pay for clean water; McCarroll & Hamann, 2020) more so than emotions. Among beliefs, researchers have commonly studied perceived risks or threats to water resources (e.g., Doria, 2009; Doria et al., 2009; Forsyth et al., 2004; Hubbard, 2020; Munene & Hall, 2019; Räsänen et al., 2017). While likely related to emotions (Floyd et al., 2000; Nelson et al., 2011), risk perceptions differ from emotions. Risk perceptions are a cognitive assessment of a situation that can *potentially* result in negative affect. However, the link is not straightforward. For example, risk perceptions could lead to fear or anger, two distinct types of negative emotions (Lerner & Keltner, 2001). Researchers have noted that it is useful to distinguish between worry and risk perceptions about climate change because people may view climate change as a risk but not be worried about it, and worry might better predict action (Weber, 2006).

The specific emotion that is most commonly studied is worry about water quality, though most researchers assess the more general emotion of concern, often without testing associations between emotions and policy support (Brenan, 2021; Cooper & Cockerill, 2015; Jones et al., 2006; McCarroll & Hamann, 2020; Munene & Hall, 2019). Other emotions, such as anger and its relation to water policy support, are less often examined. A few researchers have examined anger about water quality due to failed water policies in Flint, Michigan (e.g., Cuthbertson et al., 2016; Ezell & Chase, 2021). Yet, associations with future policies were not considered in these studies. Despite the limited attention to specific emotions in investigations of water quality, recent research on climate change points to the possible relevance of several emotions about climate change as predictors of environmental policy support (Chu & Yang, 2019; Myers et al., 2023; Smith & Leiserowitz, 2014). Similarly, research on emotions about water policy might benefit from studying multiple emotions and their association with policy support.

The target of one's emotions is also relevant to understanding and predicting policy support. Researchers studying water policies have not typically examined emotions about water policies (i.e., about the solutions); instead, they tend to focus on emotions about water quality (i.e., about the problem). Emotions about solutions are evident when considering protests, such as Dutch and Belgian farmers protesting regulations on nitrogen designed to reduce soil and water pollution (Biesemans & Rossignol, 2023; Sterling, 2023). Yet, we found only one study examining risk perceptions about water policies (e.g., Kosovac et al., 2017), and, as noted above, risk perceptions are not the same as emotions. The tendency to study emotions about environmental problems rather than policies is found in other areas, such as research on hope or fear about climate change rather than hope or fear about policies (e.g., Geiger, Dwyer, & Swim, 2023; Ojala et al., 2021; Reser & Bradley, 2017).

1.2. Types of emotional reactions

Our research goes beyond other research on public support for environmental policies by including emotions about both water quality and water policies. This research also extends a small set of studies comparing the strength of different emotions on policy support. We focused on anxiety, hope, anger, and neutrality. We examined anxiety because environmental researchers have a long-standing interest in fear and the related area of environmental concern (Cruz & Manata, 2020; Myers et al., 2023) and because worry and concern have been of interest to those study water quality (McCarroll & Hamann, 2020). We examined hope because this emotion has been gaining attention in recent research on climate change (Geiger, Dwyer, & Swim, 2023) and suggests the likely relevance to other environmental conditions, such as water quality. We examined anger because protests against environmental policies suggest that anger may be important for studying reactions to environmental policies (Biesemans & Rossignol, 2023; Sterling, 2023). Moreover, as explained below, hope and anger provide two different contrasts with fear. Last, a lack of strong feelings, such as neutral affect, is an emerging type of affect in emotion research (Gasper, 2023). While not yet examined by researchers studying environmental problems, this emotion is worthy of pursuit, given its potential to explain why some lack strong responses to environmental problems and do not support solutions.

Appraisals associated with emotions have implications for understanding which emotional responses emerge and predict policy support. Appraisal theories of emotion indicate that different emotions emerge from different appraisals (Lerner et al., 2003; Tiedens & Linton, 2001). For example, hope and fear reflect an appraisal of an uncertain future (Ortony et al., 1988). However, hope focuses on the possibility of desirable outcomes, while fear focuses on the possibility of adverse outcomes. Appraisal patterns can be nuanced. For example, anxiety and anger are both negative emotions, but anxiety suggests concern about an uncertain future (Arnau, 2018; Ortony et al., 1988), whereas anger is associated with certainty and feelings of control (Lerner & Keltner, 2001).

Action tendencies associated with emotions have implications for understanding which emotional responses predict policy support. According to the affect-as-information perspective (Clore, Gasper, & Garvin, 2001), affective and emotional experiences provide information about one's environment that shapes judgments and actions. Emotions provide information that likely influences opinions about how much people should support or oppose policies. For example, in contrast to feeling hope, anxiety, and anger, feeling neutral signals no urgent action is needed (Gasper, 2023). Thus, neutral affect might diminish support for policies. The information emotions provide and the responses they encourage depend on more than just their valence. For example, anxiety and anger are negative emotions, but anxiety may lead people to avoid a risk, whereas anger may lead people to confront a risk (Lerner & Keltner, 2001). Additionally, how these emotions are linked to environmental behaviors and judgments likely depends on the target eliciting the affect. For example, feeling anxious, angry, hopeful, or neutral about water quality differs from feeling these same emotions about water policies. Next, we delineate how anxiety, anger, hope, and neutrality about water quality and water policies might not always exert the same effect on support for water policies.

1.2.1. Anxiety

Anxiety or fear is felt when considering the prospect of an undesirable event (Ortony et al., 1988). Anxiety about water quality suggests the prospect of approaching an undesirable condition of poor water quality. Thus, anxiety about water quality could increase policy support to avoid this prospect. Research predicting support for climate change policies corroborates this prediction: After controlling for other emotions, Smith and Leiserowitz (2014) found that worry was the strongest predictor of policy support, and Chu and Yang (2019) found anxiety

(albeit not fear) was associated with policy support.

As noted earlier, emotions about water quality and emotions about water policy can produce divergent responses to policy support. While anxiety about water quality might be associated with policy support to improve water quality, anxiety about water policies suggests that the policy will have undesirable impacts, such as financial costs. Thus, anxiety about water policy could decrease policy support to avoid anticipated negative consequences of the policy, having effects opposite to anxiety about water quality. It is not anxiety per se, but what one is anxious about that should help determine whether anxiety will promote or inhibit policy support.

1.2.2. Anger

Anger arises from blocked goals and violation of standards–a violation of what ought to be–and creates a desire to remove the blockage (Carver & Harmon-Jones, 2009; Ortony et al., 1988). Anger about water quality suggests antagonistic feelings about the present state of water, potentially because something is blocking access to safe drinking water or healthy ecosystems. Anger about water quality can also reflect moral outrage, such as when harm from water quality is an environmental injustice, with certain groups of people suffering from poor quality more than others (Cuthbertson et al., 2016).

Just as was the case for anxiety, anger about water quality might operate differently than anger about water policy. Anger about water quality could increase support for policies that enhance water quality or address injustices. In contrast, if a policy produces anger, such as when it blocks one's ability to conduct business, people would be less likely to support it. Indeed, anger can motivate collective action (van Zomeren, 2013), and anger about environmental policies may have sparked European protests against such policies (Biesemans & Rossignol, 2023; Sterling, 2023).

1.2.3. Hope

Hope is felt when considering the prospect of a desirable event (Ortony et al., 1988). Hope reflects beliefs that the target of the emotion aligns with one's goals, is perceived as important, suggests possible (but not certain) desirable outcomes, and projects a positive future (Chadwick, 2015; Lazarus, 2001). Feeling hopeful about water quality leads to mixed predictions for policy support. Hope about water quality could mean that water quality is desired and essential and, thus, should be protected by policies. Hope about water quality could also mean that the future state of the water is likely good and has a favorable prognosis no matter what is done, so additional policies are unnecessary. This ambiguity about the meaning of hope is also found with climate change, where it has been noted that hope can have different meanings (Geiger, Dwyer, & Swim, 2023; Ojala, 2015): Constructive hope reflects the appraisal that one wants to or can address climate change threats and is positively associated with climate engagement; Denial hope reflects the appraisal that there is no current or potential threat to be addressed so no actions are required and is negatively associated with climate engagement (Geiger, Dwyer, & Swim, 2023).

In contrast, hope about water policies does not result in mixed predictions. Hope about policies suggests that the policy aligns with one's goals, is important, has possible desirable outcomes, and will create a positive future, all leading to support for the policy. Consistent with this proposition, the more people anticipate a climate change policy will have favorable impacts on the environment–suggestive of hope–the more they prefer that policy over policies they perceive will have less positive environmental impacts (Geiger, Swim, & Benson, 2021; Swim & Geiger, 2021).

1.2.4. Neutrality

Neutrality signals indifference (Gasper, Spencer, & Hu, 2019; Gasper, Danube, & Hu, 2021, Gasper, 2023), distinguishing it from ambivalence, which reflects simultaneously experiencing both positive and negative states. Neutrality might technically reflect an affective or general felt experience rather than an emotion (Gasper, 2023; Gasper, Spencer, & Hu, 2019; Yih et al., 2020). Nevertheless, it is an affective reaction that could shape how people think about their water quality and water policies. Neutrality differs from feeling at ease (Gasper, Danube, & Hu, 2021) in that one feels "meh" rather than the low-arousal positive feelings one would experience when calm or content. People could feel neutral about water quality and water policies for various reasons, including not thinking about water much, not believing they know enough to feel one way or another, or believing the target water source or policy is personally irrelevant. If someone feels neutral about water quality or policies, that person might not feel the need to act (Park et al., 2021) and, therefore, less likely to support policies relative to those who do not feel neutral.

1.3. Relative strength of associations

Emotions about water policies reflect appraisals of the policies, whereas emotions about water quality reflect appraisals of water. While the extant research has focused on emotions about water quality, emotions about policies may be more directly informative about water policies than emotions about water quality. Research on correspondence between attitudes and behavior supports this proposition (Ajzen & Fishbein, 2005). For example, behavioral-specific factors, such as attitudes about recycling, are better predictors of recycling than more general factors, such as attitudes about the environment (Geiger et al., 2019). Similarly, emotions about water policy may be more strongly related to policy support than emotions about water quality because there is greater correspondence between water-policy emotions and policy support than water-quality emotions and policy support. Yet, other reasons exist to test the relative strength of these associations. First, they both may predict support. For example, worry about climate change has been found to be associated with policy support (Smith & Leiserowitz, 2014) and is potentially one of the strongest predictors of policy support (Goldberg et al., 2020). Second, different reasons explain why the same emotion with different targets might influence policy support, as illustrated in our previous description of emotions. Attending to the target of emotions provides more precise theoretical predictions and could potentially explain heterogeneity in research examining whether and how emotions affect policy support.

In addition, we also test whether some emotions more strongly predict policy support than others. For instance, when considering how one feels when contemplating acting to address climate change, feeling hopeful and bored are more strongly associated with willingness to work with others (with hope positively and boredom negatively associated with willingness) than feeling anxious or helpless (Geiger, Swim, Gasper, Fraser, & Flinner, 2021). The relative predictive power of different emotions may be target-specific. Thus, we explore the relative contribution of anger, anxiety, hope, and neutrality about water quality and anger, anxiety, hope, and neutrality about water policies as predictors of policy support.

1.4. Between-person vs. within-person predictions

Although the general public and engaged stakeholders generally support water management policies, there is meaningful variability in support among different people and among different policies (Aviste, Swim & DeCoster, Manuscript submitted for publication; Stoutenborough & Vedlitz, 2014). Engaged stakeholders perceiving greater threats to water quality are more likely to support policies protecting water quality than those who perceived less threat (see supplemental materials from Aviste et al., Manuscript submitted for publication). Independent of general policy support, these stakeholders supported some policies more than others: Most preferred conservation easements and disliked dam removals, while other policies, such as management of impervious surfaces, were rated in between. In these examples, variability across people reflects between-person comparisons, whereas

variability in support for different policies reflects within-person comparisons.

Between-person and within-person predictions provide different explanations for associations of emotions with policy support. Between-person analyses test whether people who feel a certain way are more likely to support policies than those who do not share these feelings. For example, between-person analyses test whether people who feel anxious about water policies support water policies more than those who feel less anxious. In contrast, within-person analyses test whether variations within each person's emotional reactions to a set of policies are associated with variation in that person's preferences among policies. For example, within-person analyses can test whether a person is less likely to support a policy that makes them feel more anxious than a policy that makes them feel less anxious.

Using emotional reactions to policies to predict preferences among policies (i.e., within-person analyses) is theoretically and practically useful. Statistically, within-person analyses rule out personal characteristics as potential third variables explaining the associations. For example, environmentalists may be more hopeful about policies and supportive of water policies than those who do not identify as environmentalists. A commitment to protecting the environment may explain between-person associations of water-policy hope and water-policy support. In contrast, within-person analyses focus on variability across policies within individuals, so individual characteristics like being an environmentalist and other correlates of such identity cannot explain the results. Thus, using within-person analyses removes the influence of such individual differences from the within-person associations, meaning we get a clearer picture of the specific association between a given policy emotion and support for that policy.

Practically, examining differential support among policies can help plans for garnering support for a specific policy. People may be generally concerned about water quality but have issues with specific policies. For instance, although people who are hopeful about water policies may support water policies more than those with less hope, even hopeful people may be more hopeful about and like some policies more than others. Policymakers would be more successful if they focused on the policies that engender more hope or tried to improve hope among policies that produce less hope.

1.5. Linking water policies to hydro-systems

Educators have argued for developing systems thinking in education (Engle et al., 2017; Grohs et al., 2018). The inability to think about water systems and resources has been argued to lead to unsustainable water management (McCarroll & Hamann, 2020). College students have a simplified understanding of water systems (Attari et al., 2017), which may be shared by the general public. Improving water literacy, including learning about hydro-systems, could increase support for water policies (McCarroll & Hamann, 2020), given that people who endorse systems thinking, including seeing connections among food energy and water, are more likely to support environmental policies (Lezak & Thibodeau, 2016; Sajjadi et al., 2022).

The present research tests whether linking water policies to clean water via information about hydro-systems improves support for specific policies. To make this link, we provide information about *how* a water policy improves water quality (i.e., process information). Process information for water policies incorporates information about the hydro-system to explain how a policy can improve water quality. This information explains how (a) water flows through natural filters, such as soils, (b) the flow of water connects to groundwater and surface water, and (c) the policy either improves the flow to clean the water or prevents polluted water from entering the system. Process information differs from descriptive information, which merely elaborates on *what* the policy is rather than how it works.

Process information might influence people's emotions about policies, which would, in turn, influence policy support, providing a motivational reason for why such information improves policy support. We suggest that process information will affect hope about a policy. Consistent with stress and coping models (Lazarus & Folkman, 1984) and protection motivation theory (Nelson et al., 2011; Rogers, 1975), linking policies to hydro-systems might improve the appraisal of a policy's ability to enhance water quality. This appraisal might increase hope about the policy's effectiveness. Process information could also influence other emotions. Explaining the downstream effects of cleaning water or preventing the spread of pollution could improve perceptions of the breadth of a policy's positive impacts. This breadth of impact might diminish neutral affect and counteract negative appraisals contributing to anxiety or anger. Affecting hope, neutrality, anxiety, and anger would subsequently influence support for water policies.

1.6. Research Questions and hypotheses

Research Question 1: Do anxiety, anger, hope, and neutral emotions about water *quality* and water *policy* relate to water policy *support*?

(H1). Between-person predictions about water *quality*: Those who feel anxious (H1a) and angry (H1b) about *water quality* will support policy support more than those who feel less anxious and angry, whereas those who feel neutral (H1c) about water policy will support policies less than those who feel less neutral. We have mixed predictions for hope, so we treat the relation between hope about water quality and policy support as exploratory.

(H2). Between-person predictions about water *policy*: Those who feel anxious (H2a), angry (H2b), and neutral (H2c) across the *policies* will support policies less than those who feel less anxious, angry, and neutral, whereas those who feel less hope (H2d) will support policies less than those who feel more hope.

(H3). Within-person predictions about preferences among policies: Policies that prompt more anxiety (H3a), anger (H3b), and neutrality (H3c) will be supported less than policies that prompt less anxiety, anger, and neutrality, whereas policies that engender more hope will be supported more than policies that engender less hope (H3d).

Research Question 2: Strength of associations for between and within-person analyses: Do some emotions predict water policy support better than other emotions?
Research Question 3: Do *water policy* emotions better predict water-policy support than *water quality* emotions at the between-person levels?
Research Question 4: Does process information influence *water policy* emotions and water-policy support, and will the effects of process information on emotions explain (i.e., mediate) the impact of process information on water-policy support?

2. Pilot study

Before the main study, we conducted a pilot study to examine previously untested associations between emotions about policies and policy support. The pilot study also used between- and within-person analyses, providing a comparison that had not been previously made when studying associations with water policies.

After approval by the authors' institutional IRB, Introductory Psychology students (N = 192; mostly self-identifying as women, 64%, and White, 68%, and, on average, neutral in political orientation on a −2 extremely liberal to +2 extremely conservative measure, $M = -23$, *Median* = 0, and $SD = 1.02$) used signal item scales (0 "*Not at all*" to 3 "*Completely*") to rate how much they felt anxious, angry, neutral, and hope about and support for each of seven different policies (see supplemental materials for a full description of the study and results). We

averaged ratings of each emotion and policy support for the between-person analyses. On average, participants were supportive of the policies (Cronbach alpha = 0.85; $M = 1.97$, $SD = 0.67$) and felt hope about the policies (Cronbach alpha = 0.88; $M = 1.77$, $SD = 0.75$). In contrast, they reported being only slightly neutral (Cronbach alpha = 0.91; $M = 1.08$, $SD = 0.80$) about the policies and almost no anxiety (Cronbach alpha = 0.86; $M = 0.35$, $SD = 0.49$) or anger (Cronbach alpha = 0.88; $M = 0.21$, $SD = 0.80$) about the policies. See supplemental materials for correlations among emotions and policy support.

Consistent with Hypothesis 2d, standard linear regression including all four water-policy emotions as predictors of policy support revealed that water-policy hope predicted policy support, $b = 0.77$, $SE = 0.39$, $t(143) = 19.80$, $p < 0.001$, $\eta_p^2 = .73$. Inconsistent with Hypotheses 2a, 2b, and 2d, none of the other between-person associations were significant $b_{anxiety} = -0.03$, $SE = 0.10$, $t(143) = -0.27$, $p = 0.79$, $\eta_p^2 < 0.001$; $b_{anger} = -0.11$, $SE = 0.11$, $t(143) = -0.27$, $p = 0.79$, $\eta_p^2 < 0.01$; $b_{neutrality} = -0.01$, $SE = 0.04$, $t(143) = -0.21$, $p = 0.84$, $\eta_p^2 < 0.001$. A False Discovery Rate correction (Benjamini & Hochberg 1995) revealed that the magnitude of the association between policy support and hope was greater than the associations between policy support and each of the other three emotions (RQ2). Adding political orientation, identifying as a female (vs. male) and identifying as White (vs. other racial/ethnic groups) did not alter this pattern.

Using random intercept modeling and person-mean centering, we simultaneously regressed the four water-policy emotions on policy support to test within-person associations in a multilevel model. Consistent with Hypotheses 3a, 3b, 3c, water-policy anxiety, anger, and hope were associated with policy support, but inconsistent with Hypothesis 3d, water-policy neutrality was not associated with policy support: $b_{anxiety} = -0.16$, $SE = 0.04$, $t(884) = -4.42$, $p < 0.001$, within-person $\Delta R^2 = 0.01$; $b_{anger} = -0.16$, $SE = 0.05$, $t(884) = -3.31$, $p < 0.001$, within-person $\Delta R^2 = 0.01$; $b_{neutrality} = 0.003$, $SE = 0.03$, $t(884) = 0.12$, $p = 0.91$, within-person $\Delta R^2 < 0.001$; $b_{hope} = 0.68$, $SE = 0.03$, $t(884) = 27.30$, $p < 0.001$, within-person $\Delta R^2 = 0.36$. Aside from the comparison between anger and anxiety, $X^2(884) < 0.001$, $p = 0.992$, comparisons adjusting for False Discovery Rate correction (Benjamini & Hochberg 1995), revealed the strength of the association between each emotion and policy support were significantly different from each other, X^2s $(884) > 7.51$, $ps < 0.007$ (RQ2). Hope about policies was, again, more strongly related to policy support than the other emotions.

The pilot study revealed that emotions about water policy were associated with policy support, and associations with hope were the most robust. Thus, the pilot study supports further research examining emotions about policies as between-person and within-person predictors of policy support. Results did not support examining neutrality in the regressions. However, bivariate correlations of neutrality with policy support were significant, suggesting the value of further exploration (see Supplemental materials). Additionally, participants may not have known the meaning of feeling neutral. Thus, in the main study, we altered the measure to use three examples of feeling neutral to be more like other research on neutrality (Gasper, Danube, & Hu, 2021) and did the same for anxiety, anger, and hope.

3. Main study

The main study (a) retested associations of water policy emotions with policy support with a larger, nonstudent sample, (b) added water-quality emotions to compare results with more typical tests with emotions about environmental problems, (c) improved all emotion measures by using multiple-rather than single-item measures, and (d) tested effects of descriptive vs. process information on emotions and policy support.

3.1. Methods

This research was approved by the authors' institutional IRB and preregistered with OSF (osf.io/kbvz5).

3.2. Design

The study used a mixed design with one between-person factor having two levels (descriptive vs. process information) and ten policy types nested within participants. Participants rated how anxious, angry, neutral, and hopeful they felt about each policy and how much they supported each policy. They also rated their emotions about water quality in their region.

3.3. Participants

We recruited 365 US residents from Prolific's (https://www.prolific.co/) online recruitment platform and paid them $2.00 for participation. We excluded 11 participants who did not submit the survey and one who had missing data on key measures used in the analyses. As per the preregistration, we excluded four participants who took too long (more than three times the standard deviation of the completion time). No participants completed the survey too quickly (less than one-third of the median completion time). Our final sample was 349 participants with a mean completion time of 10.61 min ($Median = 8.97$, $SD = 6.59$).

We pre-registered recruiting 350 participants. The pilot study indicates that, with alpha = 0.05 and power of 0.80, we would need 300 or fewer to replicate the significant between-person correlations and over 750 to detect a significant between-person effect for anxiety. We deemed this too large to be financially feasible. Power analyses for within-person correlations (Bakdash & Marusich, 2017) indicated that we would need 95 participants to detect the smallest correlation found in the pilot study, which was for neutral affect. This power calculation also reflects the ten repeated measures (one measure for each policy) used in the main study. Thus, our analyses were adequately powered to test our planned associations.

Our sample leaned liberal ($M = -0.79$, $Median = -1.00$, $SD = 1.69$ on a seven-point scale from −3 "*Extremely liberal*" to 3 "*Extremely conservative*"). Participants were evenly split between males and females (49% male, 50% female, <1% reported being intersex) and self-identifying as men and women (49% men, 49% women, 2% non-binary or other). Participants were predominantly White (74% White, 10% Black or African American, 7% Asian, 5% Hispanic or Latino/Latina, with the remainder reporting as biracial, Native American/American Indian/Alaskan Native, or something not included in our response options). The sample generally mirrored each state's relative population size (Fig. S1 in supplemental materials).

3.4. Procedure

After consenting to participate, participants read introductory material directing them to think about the water quality where they lived, including drinking water, groundwater, and bodies of water near them. They then read a definition of water quality from the US Geological Survey (USGS, 2018) and typical water uses from the US Environmental Protection Agency (US EPA, 2014; Supplemental materials). Next, they reported their emotions about water quality in their area (see emotions measures). Participants read that local governments consider policies to improve water quality, and policies are funded by local and state funds and sometimes supplemented by the federal government. After they read this background information, they considered ten policies, presented one at a time, in random order. Participants were randomly assigned to read a general explanation of what each policy would accomplish (descriptive information) or an explanation of how the policy improves water quality (process information). After each policy, respondents reported their emotions about and support for that policy. Last, they completed demographic measures and learned the study's aims.

3.4.1. Policy descriptions

The policies maintained or restored natural areas (e.g., riparian buffers), altered the built environment (e.g., altering zoning), or

mitigated wastewater pollution (e.g., upgrading sewage pipes). Each policy had a short label, followed by a brief elaboration with process or descriptive information matched in length (see Table S6 for details). Across policies, the elaborations ranged from 23 to 56 words ($M = 32.7$), but within policies, the same number of words was used for process and descriptive information. For example, the general description of riparian buffers defined a riparian buffer ("Riparian buffers are composed of trees and shrubs growing along shorelines located next to rivers, streams, lakes, and bays. Creating riparian buffers means planting more trees and shrubs along these shorelines": 31 words). The process description explained how the plants removed pollutants and affected multiple bodies of water ("Riparian buffers (trees and shrubs growing along shorelines) remove water pollutants (e.g., fertilizers) before water flows into rivers, streams, lakes, and bays. Creating riparian buffers means planting more trees and shrubs": 31 words).

3.5. Measures

3.5.1. Emotions

Using a five-point scale ranging from 0 "*Not at all*" to 4 "*A great deal,*" participants reported the extent to which they felt four types of emotions about water quality in their local area and each water policy. For the policy emotions, they rated how they would feel about each of the ten policies if the policy had been passed. The four emotion types (and three corresponding rated emotions) were (1) anxiety (anxious, uneasy, worried; Water quality: Cronbach alpha = 0.94, $M = 1.13$, $SD = 1.01$; Water policy: Cronbach alpha = 0.91, $M = 0.61$, $SD = 0.81$), (2) anger (angry, upset, mad; Water quality: Cronbach alpha = 0.95, $M = 0.59$, $SD = 0.96$; Water policy: Cronbach alpha = 0.95, $M = 0.24$, $SD = 0.61$), (3) neutrality (neutral, indifferent, not strongly one way or the other; Water quality: Cronbach alpha = 0.92, $M = 1.46$, $SD = 1.21$; Water policy: Cronbach alpha = 0.95, $M = 0.82$, $SD = 1.02$) and (4) hope (hopeful, encouraged, optimistic; Water quality: Cronbach alpha = 0.94, $M = 1.89$, $SD = 1.09$; Water policy: Cronbach alpha = 0.98, $M = 2.26$, $SD = 1.21$).

Support

Participants indicated their support for each of the ten policies using a seven-point scale ranging from −3 "*Strongly oppose*" to +3 "*Strongly support*" (Cronbach alpha = 0.82; $M = 1.39$, $SD = 0.86$).

4. Results

4.1. Overview

First, we present between-person predictors of policy support by testing associations of emotions about water *quality* and water *policy* with policy support, with measures averaged across policies. Second, we present within-person analyses testing whether variations in emotions across policies predict preferences among policies. Third, we examine how information about policies alters emotions about policies and policy support.

4.1.1. Analyses

Analyses were conducted using the R programming language (version 4.2.2; R Core Team, 2023) within RStudio (version 2022.12.0.353; Posit team, 2023). Correlations and standard linear regression were used for between-person analyses. For within-person analyses, random intercept models tested within-person correlations and predictors of policy support using the "lmer" function in the *lmerTest* package (Kuznetsova et al., 2017). All within-person predictors were person-mean centered before being entered into random intercept models. Within-person ΔR^2s were derived from the *r2mlm* package (Rights & Sterba, 2022). Comparisons among beta coefficients were adjusted using a False Discovery Rate correction (Benjamini & Hochberg 1995). We used the "sem" function in the *lavaan* package (Rosseel, 2012) to run a 2-1-1 multilevel mediation model for the mediation analyses.

4.2. Between-person analyses

To examine whether water-quality emotions and water-policy emotions were linked with water-policy support (RQ1), we correlated these emotions with average policy support. Among water-quality emotions, only neutrality and hope were associated with policy support. Consistent with Hypothesis 1c, participants who tended to feel neutral about quality tended to support policies less, $r\,(347) = -0.17$, $p = 0.002$, 95% CI [−0.27, −0.06] (H1). Contrary to Hypotheses 1a and 1b, water-quality anxiety, $r\,(347) = -0.03$, $p = 0.554$, 95% CI [−0.14, 0.07], and anger, $r(347) = -0.01$, $p = 0.819$, 95% CI [−0.12, 0.09] were not correlated with support for water policies. We did not make a directional prediction for water-quality hope but found that participants who reported more hope about water quality were more likely to support water policies, $r(347) = 0.12$, $p = 0.025$.95% CI [0.01, 0.22]. In contrast to water-quality emotions, all water-policy emotions were associated with policy support. Consistent with Hypotheses 2a, 2b, 2c, and 2d, participants who reported more water-policy anxiety, $r(347) = -0.26$, $p < 0.001$, 95% CI [−0.35, −0.16], anger, $r(347) = -0.32$, $p < 0.001$, 95% CI [−0.41, −0.23], and neutrality, $r(347) = -0.45$, $p < 0.001$, 95% CI [−0.53, −0.36], were less likely to support water policies. In contrast, those reporting more water-policy hope were more likely to support policies, $r(347) = 0.68$, $p < 0.001$, 95% CI [0.62, 0.73].

We created three different models to examine the unique contribution of each emotion to policy support (RQ2) and compare the relative contribution of water quality and water policy emotions as predictors of policy support (RQ3). Model 1 examined the extent to which the four water-quality emotions predicted policy support. Model 2 examined the extent to which water policy emotions predicted policy support. Model 3 examined how all eight emotions predicted policy support (See Table 1).

Results were consistent with the proposition that greater correspondence between predictor and outcome measures can improve the strength of associations (RQ3; Ajzen & Fishbein, 2005, chap. xii). Less variance was accounted for in Model 1, $R^2 = 0.030$, than in Model 2, $R^2 = 0.558$, and fewer water-quality emotions than water policy emotions predicted policy support. In Model 1, only water-quality neutrality was associated with policy support, with those who felt the most neutral supporting the policy the least. In contrast to water-quality emotions, all water-policy emotions were significant predictors of policy support in Model 2 and Model 3, except that water-policy anxiety was a marginally significant predictor in Model 3. In Model 3, water-quality neutrality was not associated with policy support. Instead, water-quality hope was negatively associated with water policy support, opposite to the significant positive correlation for water quality hope. These changes were likely because of the strong positive associations between water-quality and water-policy neutrality, $r\,(348) = 0.48$, $p < 0.001$, and water-quality and water-policy hope, $r(348) = 0.43$, $p < 0.001$, combined with the greater predictive power of correspondence between water-policy emotions and policy support than water-quality emotions and policy support. Thus, results support the greater predictive power of water-policy emotions than water-quality emotions: Water-quality neutrality and hope vied for relative contribution to water-policy emotions, depending on what emotions were included in the regressions. All four water-policy emotions contributed to policy support, albeit anxiety was marginally significant when water-quality emotions were included.

We compared the magnitude of the effects for each emotion within each model (RQ2). In Model 1, despite neutral water-quality emotions being the only significant effect, none of the beta coefficients were significantly different than one another, $Fs(1, 344) < 1.72$, $ps > 0.578$. In Model 2, the effect of water-policy hope was stronger than that of all other effects, $Fs(1, 344) > 6.97$, $ps < 0.017$. There were no differences

Table 1
Between-person regression analyses with water-quality and water-policy emotions predicting policy support (Main study).

	Model 1				Model 2				Model 3			
	b (*SE*)	*t* (344)	*p*-value	Effect size (η_p^2)	*b* (*SE*)	t (344)	*p*-value	Effect size (η_p^2)	*b* (*SE*)	t (344)	*p*-value	Effect size (η_p^2)
Intercept	1.50 (0.16)	9.15	<0.001	1.50 (0.16)	0.37 (0.11)	3.21	0.001	0.37 (0.11)	0.44 (0.13)	3.43	<0.001	
Water-quality												
Anxiety	−0.05 (0.07)	−0.75	0.452	0.002					−0.07 (0.05)	−1.47	0.142	0.006
Anger	0.01 (0.07)	0.13	0.896	<0.001					0.05 (0.05)	1.05	0.297	0.003
Neutral	−0.13 (0.04)	−3.06	0.002	0.027					0.01 (0.03)	0.42	0.679	0.001
Hope	0.07 (0.05)	1.40	0.161	0.006					−0.13 (0.04)	−3.48	<0.001	0.034
Water-policy												
Anxiety					−0.18 (0.08)	−2.31	0.021	0.015	−0.14 (0.08)	−1.74	0.083	0.009
Anger					−0.30 (0.11)	−2.90	0.004	0.024	−0.28 (0.11)	−2.61	0.009	0.020
Neutral					−0.18 (0.05)	−3.85	<0.001	0.041	−0.18 (0.05)	−3.47	<0.001	0.034
Hope					0.60 (0.04)	15.70	<0.001	0.418	0.68 (0.04)	15.66	<0.001	0.419
Adjusted R^2	0.030				0.558				0.575			

$N = 349$.

among the other coefficients, *Fs*(1, 344) < 1.04, *ps* > 0.464 (RQ2). In Model 3, water-policy hope was again a stronger predictor than other effects, *Fs*(1, 340) > 11.69, *ps* < 0.002. Also, consistent with water-quality neutrality no longer predicting policy support, the effect of water-policy neutrality on policy support was greater than that of water-quality neutrality, *Fs*(1, 340) = 12.77, $p = 0.002$. There were no differences among other effects, *Fs*(1, 340) < 5.61, *ps* > 0.057.

Two additional types of analyses were conducted. First, post hoc analyses with process vs. descriptive information manipulation, political orientation, identifying as a woman (vs. a man), and identifying as White (vs. other racial/ethnic groups) did not change the results, with one exception: a marginally significant effect for water-quality anxiety became significant in Model 3. Second, because water-quality and water-policy anger and anxiety were strongly correlated (see Tables S8 and S9 in supplemental materials), we conducted regression analyses excluding one or the other of these two emotions. Results produced the same pattern and significance of predictors, except the marginally significant effect of water-policy anxiety in Model 3 became significant without water-policy anger in the analyses.

In Summary, water-policy hope was a stronger predictor of policy support than all the other emotions. Still, water-policy anger and water-policy neutrality predicted policy support, and water-quality hope emerged as a predictor of policy support when controlling for water-policy emotions.

4.3. Within-person analyses

Random intercept modeling testing variance across all ten policies with policy support as the outcome variable and no predictor variables indicated that 24% of the variance was attributable to individual differences between participants (ICC) and 76% of the variance was attributable to differences among policies, pointing to the viability of testing within-person effects. Consistent with Hypothesis 3, policies that evoked more anxiety, $r(3,140) = -0.56$, $p < 0.001$, 95% CI [−0.58, −0.54], anger, $r(3,140) = -0.47$, $p < 0.001$, 95% CI [−0.49, −0.44], and neutrality, $r(3,140) = -0.20$, $p < 0.001$, 95% CI [−0.24, −0.17] received less support, whereas policies that evoked more hope received greater support, $r(3,140) = 0.79$, $p < 0.001$, 95% CI [0.78, 0.81].

Using random intercept modeling, we simultaneously regressed policy support on the four water-policy emotions to compare each emotion's unique and relative contribution to predicting policy support (RQ2). Correlation results were replicated, except that the effect of water-policy neutrality became marginally significant (see Table 2). Aside from the comparison between anger and anxiety, $X^2(3137) = 2.01$, $p = 0.156$, the strength of the association between each emotion and policy support were significantly different from each other, X^2s (3,137) > 41.36, *ps* < 0.001. Water-policy hope was, again, a standout predictor of policy support compared to the other three emotions.

4.4. Effects of policy information

4.4.1. Main effects of type of information

Our last analyses tested the effect of providing information about how policies improve water quality (process information) on policy emotions and support (RQ4). Those who read information explaining how the policy improved water quality (i.e., process information) were more supportive and hopeful of policies than those who read descriptive information (see Table 3). Type of policy information did not influence anxiety, anger, or neutrality about policies.

4.4.2. Mediation analyses

A 2-1-1 multilevel mediation tested whether water-policy emotions mediated the effect of information type (descriptive versus process) on policy support. In this model, the level 2 variable was information type, and the level 1 variables were hope and policy support. We limited our consideration to hope as a mediator because it was the only emotion affected by policy information (see Fig. 1). Replicating the effects noted above, process information increased hope. Also, hope was positively associated with policy support, and the indirect effect of policy information on policy support via hope was significant. Thus, the effect of process information on policy support can partly be explained by its effect on hope.

5. Discussion

This study examined (a) the effects of water-quality and water-policy emotions on support for water policies and (b) whether providing process information improved policy support by altering emotions about policies. Water-policy emotions were more informative than water-quality emotions for understanding policy support. Although all the emotions were informative, water-policy hope most strongly predicted policy support in the pilot and main studies. Further, we were able to

Table 2
Within-person regression analyses with water-policy emotions predicting policy support (Main study).

	b (SE)	*t* (3,137)	*p*-value	Within-person ΔR^2
Intercept	1.39 (0.05)	30.25	<0.001	
Anxiety	−0.35 (0.03)	−13.54	<0.001	0.019
Anger	−0.27 (0.03)	−8.17	<0.001	0.007
Neutrality	−0.04 (0.02)	−1.90	0.058	<0.001
Hope	0.87 (0.02)	52.09	<0.001	0.279

$N = 349$.

Table 3
Effects of type process vs. descriptive policy information on policy support and water-policy emotions (Main study).

Outcome	Process information Mean (SD) 95% CI $n = 175$	Descriptive information Mean (SD) 95% CI $n = 174$	*b* (*SE*)	t (347)	*p*-value	Effect size (η_p^2)
Policy Support	1.51 (0.92) [1.38, 1.63]	1.27 (0.77) [1.15, 1.40]	0.24 (0.09)	2.58	0.010	0.019
Anxiety	0.60 (0.56) [0.52, 0.68]	0.61 (0.53) [0.53, 0.70]	−0.01 (0.06)	−0.18	0.854	<0.001
Anger	0.22 (0.42) [0.16, 0.28]	0.27 (0.43) [0.20, 0.33]	−0.05 (0.05)	−1.02	0.308	0.003
Neutrality	0.82 (0.75) [0.71, 0.93]	0.82 (0.73) [0.71, 0.93]	0.0002 (0.08)	0.003	0.998	<0.001
Hope	2.39 (0.91) [2.27, 2.52]	2.13 (0.81) [2.00, 2.25]	0.27 (0.09)	2.92	0.004	0.024

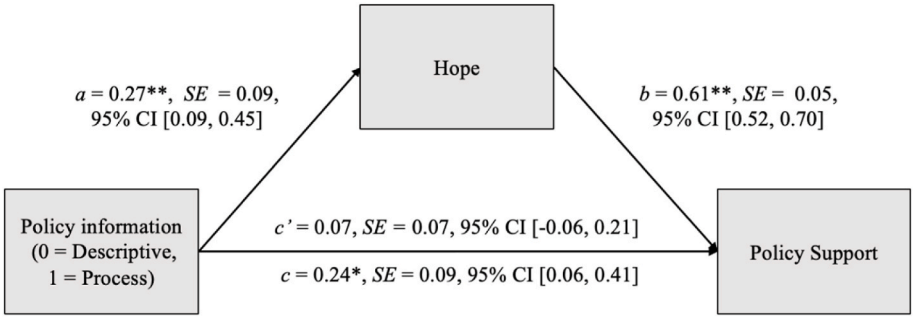

Fig. 1. Mediation model testing indirect effects of type of policy information on policy support via hope about policies.
Note. *$p < 0.05$. **$p < 0.01$. Effect from process information to policy support: Total effect = 0.24, *SE* = 0.09, $p = 0.010$, 95% CI [0.06, 0.41], Direct effect = 0.07, *SE* = 0.07, $p = 0.291$, 95% CI [-0.06, 0.21], Indirect effect via hope = 0.16, *SE* = 0.06, $p = 0.004$, 95% CI [0.05, 0.28]. While 2-1-1 mediation allows for the incorporation of variables measured at different levels (e.g., between-person or within-person), indirect effects can only represent indirect effects at level 2 (the between-person level) because a between-person predictor cannot covary with within-person outcomes at the within-person level.

affect water-policy hope by providing process information that invoked the hydro-system to explain how a policy improved water quality. This greater hope mediated the effect of process information on water-policy support.

5.1. Hope

Our research supports the apparent increase in interest in studying hope, as suggested by the growth in research on hope and climate change engagement over the last ten years (Geiger, Dwyer, & Swim, 2023). In the present research, hope about policies was the strongest predictor in the between-person and within-person regression analyses in both the pilot and main study. The between-person association illustrated that those more hopeful about policies were more likely to support the policies than those who were less hopeful. The within-person association indicated that people preferred policies that generated feelings of hope more than those that generated less hope. Moreover, when people learned *how* policies have desirable impacts on water quality, hope was improved and accounted for increases in policy support with this process information.

Water-policy hope was a more robust correlate of policy support than water-quality hope, which is consistent with research on hope about climate change engagement. A meta-analysis of correlational studies found that hope about climate change was not, on average, associated with pro-environmental engagement. In contrast, hope about specific responses to climate change was associated (Geiger, Dwyer, & Swim, 2023). This same meta-analysis revealed the average effect of manipulations designed to induce hope on climate action was very small, especially relative to correlations between hope and climate action. The small effect may be because many of these studies manipulated feelings about climate change or society's ability to address climate change rather than efficacy about specific actions. In contrast, in the present research, we increased hope by highlighting *how* such policies protect water quality via their impact on hydro-systems more than informing people that policies would protect water quality. Thus, there is converging evidence that researchers should attend to the target of hope, with greater specificity of the target improving predictive power and understanding when, why, and how hope matters.

We did not make directional predictions for associations between water-quality hope and policy support because of mixed backing for such a prediction, which was consistent with the mixed support found in our results. The correlational analyses indicated that those hopeful about water quality supported water policies more than those reporting less hope. This association suggests that at least part of water-quality hope represents a belief that policies can successfully protect water quality. Yet, once we controlled for other water-quality emotions, water-quality hope became negatively related to policy support. The negative association is consistent with "denial hope," where those who report feeling hope about climate change because they do not perceive problems are less likely to engage in climate action (Geiger, Dwyer, & Swim, 2023; Ojala, 2015). This negative association suggests that at least part of water-quality hope represents a belief that the future water quality will be clean without additional protective policies. Future research should be mindful that people may ascribe different meanings to water-quality hope.

5.2. Anxiety and anger

Anxiety and related emotions such as fear and worry are commonly used to understand or influence pro-environmental engagement, with some studies finding associations between these emotions about climate change and support for policies that would address the issue (e.g., (Chu & Yang, 2019; Smith & Leiserowitz, 2014). Less is known about anger, and we know of no research on anxiety and anger about *policies* as predictors of policy support.

Our research demonstrated that water-policy anxiety and anger were negatively associated with policy support. Between-person analyses revealed that those who felt more water-policy anxiety and anger were less likely to support policies (H2a and H2b). Correlation analyses in the main study replicated findings from the pilot study, except that anxiety

was associated with policy support in the main study and not the pilot study. Given that the direction was the same and the magnitude of the effect slightly larger in the main study, the improved measures of emotion and larger sample size may have increased our ability to detect the associations of anxiety with water-policy support in the main study. Like the between-person analyses, within-person analyses indicated that less preferred policies prompted more anxiety and anger (H3a and H3b). The within-person correlations in both the pilot and main study provide confidence that the influence of these emotions on policy support was independent of characteristics of people who report such emotions and support water policies.

In contrast to our predictions (H1a, H1b), water-quality anxiety and anger were not associated with water-policy support. In the present study, people were not anxious or angry about water quality, with many indicating none of these emotions (see supplemental material), suggesting they did not feel particularly threatened by poor water quality. The result might differ if the sample included more people with stronger anger and anxiety about water quality. For example, Smith and Leiserowitz (2014) observed a strong presence of climate change worry, which was positively associated with policy support. In contrast, Smith and Leiserowitz (2014) reported low levels of climate change anger and found climate change anger was unassociated with policy support. Thus, a certain threshold of emotion might need to be present for emotions about water quality to predict policy support.

5.3. Neutral emotions

Those who felt neutral about water quality were less supportive of water policies than those who felt less neutral (H1c). Perhaps those who felt neutral about water quality believed action was unnecessary to improve it, thus reducing people's support for new water policies. Caution about this conclusion is in order because this association was no longer significant when controlling for emotions about policies. Yet, water-policy neutrality was relevant. Individuals who felt neutral about water policies supported policies less than those who felt less neutral (H2c). Similarly, relative to feeling and support for other policies, the more a policy prompted neutral emotions, the less they preferred it (H3c). This finding suggests that assessing neutral feelings might be a fruitful means to detect the indifferences that some of the populace feels about environmental policies.

Overcoming indifference might be necessary to garner sufficient policy support. While explaining how a policy improves water quality is not a means for overcoming indifference, there may be other ways to reduce indifference. One possibility is to reveal other people's support for policies (Sparkman et al., 2022). It may also be necessary to consider what people feel when their neutral emotions decrease. For some, overcoming their indifference may lead to emotions that support policies, while for others, it may lead to emotions that lead to opposing policies.

5.4. Water-quality vs. water-policy emotions

Water-policy emotions accounted for more variance in support for water policies than water-quality emotions (RQ3). Water-quality anxiety and anger were not associated with policy support, contrasting with water-policy anxiety and anger being associated with water-policy emotions. This greater predictive power is not simply a methodological point about correspondence in measurement. First, the distinction is theoretical. There are different reasons as to why emotions about policies versus water quality would be associated with policies. Explicating reasons for the associations reveals different predictions when considering anxiety and anger about water quality versus water policies. Moreover, hope can have different meanings, and being precise about the target of hope helps identify its meaning. Thus, a thorough understanding of associations between emotions and policy support needs to consider the target of the emotions.

Second, there are other reasons to consider the differences between water-quality and water-policy emotions. For example, future research could test whether emotions about water quality influence emotions about water policies. Increasing anxiety and anger about water quality by explaining threats to water might result in greater hope that policies could overcome the threats to water quality. Yet attention to different water policies is likely still needed: Anger and anxiety about water quality may increase hope in some policies and less in others.

Third, the greater predictive power of water-policy emotions than water-quality emotions suggests that addressing emotional reactions to policies may be more effective at altering policy support than altering water-quality emotions, especially if there are floor or ceiling effects associated with emotions about water quality. This proposition is like the argument that more attention to the public's response to different policies is needed because people in the US and elsewhere mostly acknowledge that climate change exists and is a threat but vary in their support for various climate policies (Geiger, Swim, & Benson, 2021; Sparkman et al., 2022).

5.5. Who supports policies versus which policies people support

In addition to differing statistical power, between-person and within-person analyses address different questions. Between-person analyses can reveal the types of people who agree that some policy is needed, but these people may disagree about which policy to support. Within-person analyses can reveal why people react differently to different policies. The ability to implement and fund policies may require attending to the prioritization of policies. Moreover, greater variability between policies than between people provides further support for acquiring a greater understanding of why people respond differently to policies that all have a shared overarching goal, in this case, of protecting or improving water quality. Understanding reasons for relative preferences may lead to improved communication about a policy's benefits, such as revealing enhanced community health, or a policy's costs, such as explaining why a tax increase is fair. Or, rather than changing communication, knowing the qualities of policies that influence emotions may provide direction as to what aspects of policies need to be altered, such as improving the fairness of taxation amounts.

5.6. Systems information

In the present research, we made salient the connection between water policies and cleaner water via its impact on hydro-systems. Thus, in contrast to past research on general system thinking (e.g., Ballew et al., 2019), we focused on a specific system, hydro-systems. Moreover, rather than concentrating on between-person differences in systems thinking, we explicitly manipulated whether we connected water policies, hydro-systems, and cleaner water versus describing the water policies. Connecting to hydro-systems may have increased people's confidence in the value of water policies. This increased confidence may be why such information improved hope about the policies. Future research could also consider the possibility that systems information affects policy support via other mechanisms, such as perceived credibility or trust in the information.

5.7. Limitations and future directions

Our findings may not extrapolate to research conducted on substantially different policies. For example, anger and anxiety might be stronger predictors of support for particularly threatening policies (e.g., policies that would cost people a lot of money, Swim, Geiger, & Guerriero, 2022). Also, process information may have different effects on different policies, making it essential to pre-test the impact of process information on policies before implementing this strategy (see Supplemental materials). Moreover, some policies may be less relevant in some regions of the country than others. For example, if there are no dams in

one's region, then a policy about dam removal does not apply. Nonetheless, we asked people to consider their local water quality and the possibility that the policies were under consideration in their local area. Thus, our results represent overall trends by averaging across locations. Moreover, our between-person analyses averaged across policy types, thus representing a general assessment of policies, and the within-person variation was not dependent on a pre-determined ordering of policies but was idiosyncratic to individuals.

Our results may not generalize to specific populations for similar reasons. For example, certain groups may experience more water-quality anxiety or anger (e.g., if particular groups are affected by poor water quality or policies are unfair to specific social groups, Cuthbertson et al., 2016). The lack of predictive power of anxiety and anger was more evident for water-quality emotions than water-policy emotions. Despite low mean levels of anger and anxiety about water quality in our study, it is notable that about 50% of the US population report concern about water quality, and just over half express "a great deal" of worry about the pollution of both drinking water (56%) and rivers, lakes, and reservoirs (53%) (Brenan, 2021). Assessing feelings about threats to water quality may be more predictive than feelings about current water quality (Aviste et al., Manuscript submitted for publication). The US government recently reported that 45% of tap water in the US is contaminated with "forever Chemicals" (i.e., PFAS: per- and polyfluorinated alkyl substances; Smalling et al., 2023). People may be unaware of these current conditions, and raising awareness about them may increase the predictive power of emotions about current water quality.

More could be done to understand policy emotions. For example, because we did not assess emotional appraisal dimensions, we cannot say for sure that hope reflects efficacy, anxiety reflects uncertainty, neutrality reflects indifference, and anger suggests perceived blockages of goals. Future research could specifically assess these possibilities. Also, more attention could be given to the potential impact of other emotions on policy support. While different from emotions about policy support, others have examined guilt or pride about the pro-environmental actions one has taken (e.g., Adams et al., 2020; Shipley et al., 2023). People may feel guilty if they think their water quality is or will be poor. They may feel pride if they imagine their community passed a particular water policy.

Except for comparing process vs. descriptive information, the study's results are correlational. Controlling for individual differences did not alter the significance or directionality of our between-person results. We measured emotions before measuring policy support, suggesting that directionality is a counter explanation for associations. Yet, we cannot rule out the possibility that unmeasured, outside variables correlated with study variables could provide an alternative explanation for our between-person results. While the within-person analyses rule out individual differences as an alternative explanation for the associations we report, untested variables could moderate the strength of our findings.

More attention could be given to the effects of different types of policy-relevant information. This study did not have a condition where people received no information about policies; descriptive information might influence emotions about policies and policy support relative to no information. Yet, it is revealing that there was an incremental benefit to explaining how water policies improve water quality. It might be helpful to examine other types of information. For example, information that addresses how environmental injustices may affect the strength of association between anger and policy support, particularly for policies that might produce more anger than those examined in the present research.

6. Conclusions

The public has the power to encourage policy changes that are critically needed to improve water quality. Understanding emotions about policies helps explain variation in who supports water policies, whereas understanding variation in emotions across policies helps explain which policies people are likely to support. Both possess implications for garnering public support. This study revealed that water policy support depended more strongly on how people felt about policies than how they felt about water quality. The same may be true in other environmental domains, such as climate change, where a meta-analysis suggests that hope about specific means of addressing climate change is a stronger predictor of engagement than general hope about climate change or society's general ability to address climate change (Geiger, Dwyer, & Swim, 2023). Focusing on water policy emotions, we found that people who felt hope about water policy supported policies more than those who felt less hope, and policies that generated more hope were supported more than policies that generated less hope, with water-policy hope being a more robust predictor than water-quality hope. While less strongly associated than water-policy hope, we also observed that water-policy anger, anxiety, and neutrality were negatively associated with support for policies.

In addition, we observed that providing information about how a policy works (process information) led to greater support than merely claiming that a policy can help (descriptive information) and that this advantage can be explained by the ability of process information to enhance hope about policies. These results point to the value of highlighting domain-specific system information when talking about environmental policies. The results also suggest that process information should be a focus of messaging about water policies because this information enhanced support for new policies. Thus, while the public may have strong feelings about their water quality, it is their feelings about water policies and their understanding of how those policies improve water quality that are essential to supporting policies that improve water quality.

CRediT authorship contribution statement

Janet K. Swim: Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **Joseph G. Guerriero:** Writing – review & editing, Writing – original draft, Visualization, Formal analysis. **Karen Gasper:** Writing – review & editing, Conceptualization. **Jamie DeCoster:** Writing – review & editing, Formal analysis. **Micheal L. Lengieza:** Writing – review & editing, Conceptualization.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jenvp.2024.102385.

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