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When Are Loss Frames More Effective in Climate Change Communication? An Application of Fear Appeal Theory

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Abstract: This study investigated how goal frames (gain, non-loss, loss) either with or without efficacy statements affect consumers' support for climate-change policy. Addressing the goal-framing literature's difficulty in establishing a guiding theory with consistent findings, we (1) propose fear appeal theory as an alternative framework to guide goal-framing research; (2) test five fear appeal variables (fear, perceived threat, hope, perceived efficacy, and message processing) as mediators of goal-framing effects on policy support; and (3) highlight four common goal-framing confounds that may partly underlie the literature's inconsistent findings. Aligning with fear appeal theory, results from a carefully controlled experiment revealed that a more threatening loss frame paired with an efficacy statement produced the strongest pro-policy attitudes and the greatest willingness-to-pay by successfully balancing fear/threat with hope/efficacy and by producing deeper message processing.

Keywords: message framing; gain and loss framing; fear appeal theory; extended parallel process model; climate change communication; consumer behaviour

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1. Introduction

> Climate change is affecting weather patterns and creating climate extremes in every region across the globe. Evidence of such changes include heatwaves, heavy precipitation, mudslides, droughts, and cyclones. These and other weather events are being clearly attributed to human factors.
>
> —Intergovernmental Panel on Climate Change's Sixth Assessment Report 2021 [1]

It is important to gain consumers' support for pro-environmental policy to help address these catastrophic climate related effects. Despite this growing urgency, marketers remain uncertain about the types of messages that best motivate consumers' pro-environmental policy support and behavior. Marketers frequently face a choice of emphasizing either the positive consequences of acting against climate change or the negative consequences of not acting. Positive consequences may be expressed through gain frames depicting action causing desired outcomes (e.g., with mitigation, climate conditions will be safe) or non-loss frames depicting action preventing undesired outcomes (e.g., with mitigation, climate conditions will not be dangerous). However, marketers can recast positive frames (gains or non-losses) to express negative consequences through loss frames depicting inaction causing undesired outcomes (e.g., without mitigation, climate conditions will be dangerous). Levin, Schneider, and Gaeth [2] referred to such linguistic manipulation as goal framing. Levin, Schneider, and Gaeth [2] distinguish two types of positive frames, but do not title them. We adopt the titles gain frame and non-loss frame from Cesario, Corker, and Jelinek [3]. The authors of [2] also distinguish two types of negative frames, which the authors of [3] title loss frame and non-gain frame. Non-gain frames depict inaction failing to produce desirable outcomes (e.g., "If we do not mitigate climate change, conditions will not be safe"). Because non-gain frames generally involve double negation, they are impractical to use for an entire message and were excluded from this study. If

most climate change outcomes can just as easily be framed as gains, non-losses, or losses, which is preferable and why? Although a seemingly straightforward question, the answer remains unclear.

To date, most answers are derived from prospect theory [4]. It was first argued that loss frames are more persuasive because of loss aversion: people prefer to avoid losses than to obtain gains of equal size. However, researchers did not find a consistent loss-frame advantage. To reconcile the inconsistent findings, Rothman and Salovey [5] derived a hypothesis—termed the risk-framing hypothesis by Van 't Riet et al. [6]—that became ubiquitous in the field. Based on prospect theory's reflection effect, which describes how framing reverses risk preferences in decision-making, the risk-framing hypothesis posits that loss frames best promote risk-taking behavior, whereas gain frames best promote risk-preventing behavior. For example, the risk-framing hypothesis predicts that disease-detection behaviors are best promoted with loss frames, as such behaviors involve risk-taking (e.g., undergoing a mammogram involves taking the risk of being diagnosed with cancer), whereas disease-prevention behaviors are best promoted with gain frames, as such behaviors involve only preventing future risks (e.g., applying sunscreen to prevent skin cancer risks). Despite its enduring popularity, meta-analyses of hundreds of framing effects [7,8] offer little evidence for the risk-framing hypothesis. Loss frames are not more persuasive than gain frames for disease-detection behavior (except for a very small loss-frame advantage of $r = -0.056$ for breast cancer detection; [8]) and gain frames are not more persuasive than loss frames for disease-prevention behaviors (except for a small gain-frame advantage of $r = 0.154$ for dental hygiene behaviors; [7]). Research in the sustainability domain has also yielded mixed findings: there is evidence for both a gain-frame advantage and a loss-frame advantage [9,10].

We argue that the risk-framing hypothesis may have significant theoretical flaws. First, as Van 't Riet et al. [6] explain in their critical review, the risk-framing hypothesis attempts to use prospect theory—a decision-making theory that defines risk as uncertainty—to explain persuasive message effects (not decision-making) where risk involves threat (not uncertainty). Thus, it appears the risk-framing hypothesis' lack of meta-analytic support is largely because it misapplies prospect theory to explain seemingly different phenomena. Secondly, the risk-framing hypothesis has largely examined health-related issues [5,11,12] that directly benefit consumers rather than others (e.g., support for pro-environmental policy benefits society). As consumers encounter self-others trade-off when supporting pro-environmental policy, the risk framing hypothesis that highlight outcomes only for consumers may not appropriately explain such behavior. Therefore, goal framing in the sustainability domain needs alternative theory both at the broad level (a guiding theoretical framework for goal framing, as prospect theory once provided) and the specific level (an understanding of processes underlying goal-framing effects).

To do that, we first suggest fear appeal theory as an alternative theoretical framework for goal framing. That is, we conceptualize loss frames as fear appeals and apply the extended parallel process model (EPPM; danger control process vs. fear control process, [13]) to suggest the inclusion of efficacy statements in the loss-framed messages to maximize their persuasiveness. Second, we investigate processes underlying framing effects on persuasion by testing five fear appeal variables as mediators: fear, perceived threat, hope, perceived efficacy, and message processing. Third, we address four common confounds in goal-framing research as these confounds could partly explain the conflicting results in goal-framing meta-analyses.

The remainder of the paper is organized as follows: first we review the relevant theories, and this review leads to the presentation of our hypothesis. We then test these hypotheses in an experiment and discuss the results. The paper concludes with a discussion of the key findings and identifies opportunities for future research.

2. Theoretical Background

2.1. Fear Appeal Theory: A New Framework for Goal Framing

Loss frames present a series of negative, often threatening, outcomes. Unsurprisingly then, climate-change loss frames produce more fear than gain frames [14,15]. Does this threat and fear matter? Threat and fear are generally overlooked or ascribed an ancillary role in goal framing. In fear appeal theory, however, threat and fear are ascribed a central role as the core drivers of persuasion [13]. Because loss frames evoke these core fear appeal variables, we suggest loss frames are a form of fear appeal. Although loss frames are strictly defined by their linguistic structure (i.e., conditional propositions with the structure "if not-then [*undesired outcome*]") while fear appeals are more defined by their effects (i.e., the fear and perceived threat they elicit), the definitions of loss frames and fear appeals may largely be emphasizing different aspects of the same persuasive message, which may be understood with the same theory. If correct, fear appeal theory may offer an established and well-evidenced framework to guide goal-framing research and explain goal-framing effects in the sustainability domain.

The dominant model of fear appeals is the extended parallel process model (EPPM; [13]). The EPPM details how fear appeals may succeed or fail depending on which of two "parallel processes" dominate in a consumer's response to a fear appeal: the adaptive *danger-control process* in which the consumer accepts the danger of the threat described in the fear appeal and attempts to mitigate that threat (e.g., accept the danger of climate change impacts and support pro-climate policy) or the maladaptive *fear-control process* in which the consumer rejects the message and attempts to reduce their fear without mitigating the threat (e.g., deny the danger of climate change impacts and oppose pro-climate policy). Successful fear appeals therefore maximize danger-control processing. To do so, the EPPM posits that fear appeals must convince consumers of two components of a threat: (a) *threat severity* (i.e., the threat has serious consequences) and (b) *threat susceptibility* (i.e., the threat will likely occur without protective action). If consumers perceive sufficiently high threat severity and susceptibility, fear is evoked. However, consumers may cope with this fear maladaptively through fear control processes unless they also perceive high *efficacy* (i.e., perceive they are capable of action that can avert the threat). The EPPM therefore states fear appeals must use efficacy statements to bolster perceived efficacy and minimize fear-control processes.

The most recent and comprehensive meta-analysis of fear appeals [16] supports the EPPM's key tenet that successful messages increase perceived efficacy alongside fear and perceived threat. Tannenbaum et al.'s [16] findings diverge slightly from the EPPM, however, in that efficacy statements approximately double the positive effects of fear appeals but are not *required* for positive effects. Regardless, if loss frames may be understood as fear appeals, both the EPPM's theorizing and Tannenbaum et al.'s [16] meta-analysis suggest loss frames are most effective with efficacy statements. Without efficacy statements, researchers may underestimate the effectiveness of loss frames and conclude they are worse or no better than other frames. Similarly, in the sustainable consumption domain, researchers have theorized that fear appeals accompanied by efficacy statements would maximize persuasion's effectiveness [17].

Communicating threats without accompanying efficacy statements is likely a poor strategy within climate-change communication. The global complexity of the climate crisis has been labelled a "super wicked problem" [18]—a problem that challenges positive efficacy perceptions by lacking any definitive solution and, despite growing urgency, faces slow progress because of political polarization, limited cooperation among stakeholders (consumers, governments, and industry), and the public's tendency to prefer policy addressing short-term, not long-term threats. Moreover, many consumers are unfamiliar with climate-change solutions or doubt their effectiveness [19], while the media frequently covers threats and *negative* efficacy information rather than pro-climate solutions [20]. Consequently, it is unsurprising that only 5% of Americans are confident humanity will successfully manage climate change [21].

Beyond bolstering perceived efficacy, efficacy statements also protect against two other potential loss-frame pitfalls. First, efficacy information evokes feelings of hope [22]—an important predictor of pro-climate attitudes beyond perceived efficacy (e.g., [23]) that may be usefully added to the EPPM [24]. As Nabi [25] argues, fear appeals may be better conceptualized as "fear-hope" appeals. This is because efficacy information explains what actions will counter the threat described in the fear appeal—a situation that closely aligns with what is theorized to elicit hope: "the wishing or yearning for relief from a negative situation" [26] (p. 282). In the climate-change context where hopelessness is well documented [19] and encapsulated in coinages such as "ecoanxiety" [27] and "apocalypse fatigue" [28], it appears crucial to include hope-inspiring efficacy information. Second, efficacy statements may deepen message processing. The EPPM predicts that when consumers perceive high efficacy, they process fear appeals deeply rather than defensively denying, ignoring, or minimizing them [13]. Moreover, with deeper message processing, consumers better notice the strength of a fear appeal's argument and therefore experience the fear appeal as more persuasive [29]. Consistent with this reasoning, several studies observed that deeper processing of threatening climate change messages enhances pro-climate attitudes [15].

2.2. Hypotheses and Research Questions

Using the EPPM framework, we predict the goal framing that best increases pro-policy attitudes and willingness-to-pay (a) maximizes fear and perceived threat, (b) reinforces hope and perceived efficacy, and (c) elicits deeper message processing. When goal frames include efficacy statements, we predict that loss framing best maximizes these variables: Loss-framed outcomes produce a more fearful and threatening message, while including an efficacy statement buffers against losses of hope and perceived efficacy. Therefore:

Hypothesis 1 (H1). *With an efficacy statement, loss framing produces stronger pro-policy attitudes and willingness-to-pay than gain and non-loss framing.*

Hypothesis 2 (H2). *The stronger pro-policy attitudes and willingness-to-pay produced by loss framing with an efficacy statement is mediated by (a) greater fear and perceived threat than gain and non-loss conditions; (b) greater hope and perceived efficacy than loss framing without an efficacy statement; and (c) greater message processing than all conditions.*

However, when goal frames lack efficacy statements, it is less clear which frame is most persuasive. Each frame may have a strength, but also a weakness. As loss frames exclusively present undesired outcomes, they may have the strength of evoking greater fear and perceived threat but the weakness of undermining perceived efficacy and depriving audiences of hope. Conversely, because gain frames exclusively present desired outcomes, they may have the strength of evoking greater hope and perceived efficacy but the weakness of downplaying the severity of climate change threats. Unlike loss or gain frames, non-loss frames may have the strength of balancing fear/threat with hope/efficacy: Although non-loss frames depict undesired outcomes, those outcomes are negated (e.g., *with mitigation, we* will not *be endangered by frequent extreme weather events*). However, although balanced, non-loss frames may have the weakness of being neither as threatening as loss frames nor as optimistic as gain frames. Maximally persuasive fear appeals depict *high* levels of threat and efficacy, not merely balanced levels. Therefore:

RQ1. *If each goal frame (gain, non-loss, and loss) without efficacy statements has unique strengths and weaknesses, what frame (if any) produces stronger pro-policy attitudes and willingness-to-pay?*

RQ2. *Despite gains and non-losses both depicting positive consequences, do they have different effects on pro-policy attitudes and willingness-to-pay (RQ2a) or on any mediator (RQ2b)?*

2.3. Controlling Potential Goal-Framing Confounds

Lastly, beyond our two theory-related goals of using the EPPM as a guiding framework and testing its variables in mediation, we next detail our third, design-related goal of controlling four potential confounds commonly found in goal-framing studies.

2.3.1. Mislabeled and Mixed Frames

This study distinguishes the two positive frame subtypes (gains from non-losses) and the two negative frame subtypes (losses from non-gains). Subtypes should be tested separately to uncover their possible unique effects on fear, hope, perceived efficacy, and perceived threat [14] and to reduce conflicting goal-framing results [3,6]. However, only one pro-environmental framing study [14] appears to have separately tested gains, non-losses, and losses. Instead, conditions titled *gain frame* or *positive frame* often mix together gains and non-losses, while conditions titled *loss frame* or *negative frame* often mix together losses and non-gains (e.g., "By NOT recycling, reusing, and conserving energy, you Fail to Preserve the health of your planet [non-gain-framed outcome] and in doing so, Endanger . . . the future of your friends, family, and community [loss-framed outcome]," [30], (p. 73)). More concerningly, loss frames sometimes mix in positively framed sentences (e.g., [31]), creating a "mixed frame" with likely different effects than a pure loss frame. Mixed frames also occur with images (e.g., gain frame mixed in losses by including non-loss statements and threatening images of urban flooding [15]).

2.3.2. Nonequivalent Frames

By definition, goal frames should present outcomes that differ in valence but are otherwise logically equivalent [2]. When a study tests nonequivalent frames, it is uncertain whether the study's results are caused by intended valence differences or by unintended message-content differences. Almost all pro-environmental goal-framing studies have some avoidable nonequivalence, however. Most seriously, some studies present entirely different arguments between frames. For example, Van De Velde et al.'s [32] negative frame describes energy-crisis impacts, but the positive frame describes biofuel benefits. Less seriously, other studies present the same argument but different outcomes. For example, a gain-framed outcome in Bilandzic et al. [14] (p. 476) stated "there is a good chance the sea level will stay constant" and that shorelines will "remain the way they are today," but the loss-framed outcome stated "the sea level will rise" and that shorelines will "be threatened by . . . erosion and coastal flooding". These outcomes differ in more than valence: only the loss frame describes specific outcomes (erosion and flooding) while only the gain frame expresses probability ("a good chance"). In the present study, we wrote frames as equivalent as possible, choosing pairs of framed words that are precise antonyms (e.g., pairing *poorly protected* with *well protected*, not *safeguarded*).

2.3.3. Inconsistent Use of Efficacy Information

Some frames are paired with optimistic messages/images or recommended solutions—information that may serve the critical role of an efficacy statement or hope appeal. However, we found no pro-environmental goal-framing studies acknowledging the effects of including (or excluding) such efficacy-related information. If one study's loss frame reinforces hope and efficacy but another study's does not, the two studies differ by a critical message component according to the EPPM [13]. For example, the successful loss frame in White et al. [10] included several bullet points detailing how to recycle alongside a picture of a smiling family doing so. The direct and indirect effects of such a loss frame may not be comparable with other loss frames that strictly present negative outcomes (e.g., this study's loss-framed condition without an efficacy statement).

2.3.4. Reactance and Controlling Language

Although loss frames highlight threatening consequences, they need not adopt a threatening tone of issuing imperatives (e.g., "You've got to place fewer demands on the

environment. Cut back. Restrain. Conserve. Change your lifestyle and behaviors so that they cause less harm," [33] (p. 290)) or chastising readers (e.g., "By refusing to add these activities to your life, you can be confident that you have done little . . . to make the planet as a whole a better place," [34], (p. 1022)). These examples illustrate *controlling language* or "forceful language that blatantly pressures audiences to conform" rather than language that is "more polite with less obvious persuasive intentions" [35] (p. 1464). Controlling language may threaten one's freedom and may therefore incite psychological reactance [36,37]. In turn, reactance produces anger, counter-arguing, rejection of the message or the messenger, and ultimately, noncompliant or even oppositional behavior. Because pro-climate action and policy often already restrict freedoms (e.g., carbon taxes; bans on environmentally hazardous products), controlling language may incite consumer reactance. Pro-climate action and policy are also divided across sensitive political lines and deeply held values. Climate change communicators may therefore come across as hectoring or moralistic and provoke counterproductive emotional [22] or cognitive [38] reactions, especially among the political right. To minimize such issues, our framed text avoided controlling phrases common in loss frames (e.g., *if you reject/refuse/ignore; if you fail to; unless you; you need to/must*) and controlling stylistic choices (e.g., uppercase sentences, repeatedly setting *not* in italics or uppercase, red-colored text, or exclamation points).

3. Materials and Methods

3.1. Design and Participants

Introductory psychology students at a large Canadian university took part in a 3 (goal frames: loss vs. gain vs. non-loss) × 2 (efficacy statements: present vs. absent) between-subjects design in exchange for partial course credit. We excluded 76 participants failing either of two simple attention checks (e.g., "For this item, please select 3"). The remaining 934 participants were mostly young (M_{age} = 19.47, *SD* = 3.88), female (65.7%), of various racial identities (65.3% White; 17.8% Asian; 8.6% Black; 4.2% Inuit, First Nations, or Métis; 4.1% Other or Mixed), politically left of center (*M* = 4.41, *SD* = 1.42; 1 = *Very conservative;* 7 = *Very liberal*), and low in climate change skepticism (*M* = 1.80, *SD* = 1.04; measured with two reverse-scored items: "Climate change is definitely occurring", "Human activities [i.e., greenhouse gas emissions] are causing climate change"; 1 = *Strongly disagree;* 7 = *Strongly agree*).

3.2. Procedure and Materials

Participants in efficacy-present conditions began by reading an efficacy statement. The statement aimed to reinforce perceived efficacy and hope by describing perhaps the most promising global effort to tackle climate change to date: the United Nations' Paris Agreement. The Paris Agreement's chief goal is to ensure international safety from climate change impacts by preventing a global temperature increase beyond 2 °C. The efficacy statement explained that Canada alongside 150 other countries signed the Paris Agreement in late 2016 and that Canada would soon implement policy to reduce carbon emissions. This information was omitted in efficacy-absent conditions.

Next, all participants were asked to consider their attitudes toward and willingness-to-pay for a fictitious policy to reduce Canadian carbon emissions by 75% over 35 years at a $20 billion annual cost. The policy involved sustainable development in energy, transportation, waste management, and greenspace, as well as new efficiency regulations for industry, vehicles, homes, and buildings. Following the policy description, participants read a rationale to support the policy framed in gains, losses, or non-losses. This framed text described climate change impacts including those on environmental and human health, downstream effects on the economy and international relationships, and overall risk severity. The frames were created by adapting information from the United Nations' Paris Agreement document and other documents published by governmental organizations in several developed countries (Supplementary File S1).

3.3. Measures

3.3.1. Emotions

Participants reported how strongly they felt fear (*worried, afraid*; $r = 0.67$) and hope (*hopeful*) after reading the message (1 = *Not strongly at all*; 7 = *Very strongly*). Consistent with Chadwick [39], a single item measured hope, as the causes, feelings, and effects of hope are singular among emotions, without any related words accurately capturing this experience.

3.3.2. Perceived Threat

Three items tapped into the EPPM cognitive constructs of threat severity and susceptibility: "Climate change impacts are likely to pose a major threat to society"; "Without mitigation, climate change will likely cause serious, persistent environmental impacts"; "Without mitigation, climate change will likely result in severe risks worldwide" (1 = *Strongly disagree*; 7 = *Strongly agree*). Additionally, because current climate change risk-perception models [40] include not only cognitive factors but also affective factors, we measured two affective constructs from [41]: holistic concern (i.e., overall concern about climate change; 1 = *Not concerned at all*; 7 = *Very concerned*) and holistic affect (i.e., overall positive or negative feelings toward climate change; 1 = *Very negative*; 7 = *Very positive*). The five threat items formed a reliable index ($\alpha = 0.81$).

3.3.3. Perceived Collective Efficacy

Bandura [21] (p. 477) defines 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". Although Witte's [13] original formation of the EPPM included only perceived self-efficacy, Witte and colleagues later argued and found evidence that perceived collective efficacy is a logical and valid extension of the EPPM when applied to collective problems (e.g., [42]) such as in the sustainability domain [17]. Given that our message discussed climate change—a global threat requiring the cooperation of all nations—we measured perceived collective efficacy of governments, nations, and humanity, using three 7-point items ($\alpha = 0.71$) adapted from [43].

3.3.4. Message Processing

Participants reported how involved they were with the message, how much the message held their interest, and how carefully they read the message using three 7-point items ($\alpha = 0.68$) adapted from [44].

3.3.5. Policy Support

Pro-policy attitude was measured with four 7-point items ($\alpha = 0.87$): "How strongly do you agree or disagree with the message supporting Canada's carbon policy?" (1 = *Strongly disagree*; 7 = *Strongly agree*); "How positive or negative do you feel about Canada's carbon policy?" (1 = *Very negative*; 7 = *Very positive*); "If Canada's carbon policy was enacted, how strongly would you support or oppose the policy?" (1 = *Strongly oppose the policy*; 7 = *Strongly support the policy*); "If you agree to support Canada's carbon policy, how strong is your agreement?" (0 = *I disagree with the policy*; 1 = *Not strong at all*; 7 = *Very strong*).

We also assessed willingness-to-pay as a less direct measure of policy support than explicitly asking participants to report attitudes. Willingness-to-pay was first assessed with an open-ended method in which participants stated how much money (from \$0 to \$500) they would be willing to sacrifice from a \$6000 monthly salary to fund the policy. The second willingness-to-pay method used three dichotomous choices. In this method, participants supposed they earned \$2000 per month as an average university student and were asked if they would accept or reject the policy if it costs them \$75 per month. If they accepted (rejected) the first choice, they were presented with a second choice at 150% (50%) the cost of the first choice. If they accepted (refused) the second choice, they were presented with a final choice at 150% (80%) the cost of the second choice, yielding six values of minimum willingness-to-pay: \$30, \$38, \$57, \$90, \$113, and \$170. The strongly correlated

(r = 0.63) willingness-to-pay values from these two methods were standardized to range from 1 to 7 and averaged, allowing a more reliable and valid measure of willingness-to-pay than a single-item measure.

3.3.6. Perceived Message Strength

Participants reported their perceptions of message strength through three 7-point items (α = 0.90): "Did the message provide strong reasons for supporting Canada's carbon policy?" (1 = *Not at all strong*; 7 = *Very strong*); "Is the message's argument for supporting Canada's carbon policy a weak or strong one?" (1 = *Very weak*; 7 = *Very strong*); "How effective was the message supporting Canada's carbon policy?" (1 = *Not at all effective*; 7 = *Very effective*).

4. Results

4.1. Impact of Goal Framing on Pro-Policy Attitude, Willingness-to-Pay, and Perceived Message Strength

Random assignment was successful, as no conditions differed in gender, age, political orientation, or climate change skepticism. Analyses of covariance (ANCOVAs) with climate change skepticism and political orientation as covariates assessed differences in mediators, policy support, and perceived message strength among conditions (see Table 1 for adjusted means and Supplementary Files S2 and S3 for full ANCOVA statistics). Consistent with H1, loss frame was only superior to gain and non-loss frames when it included an efficacy statement. More specifically, participants in the loss/efficacy-present condition expressed stronger pro-policy attitudes than those in the gain/efficacy-present ($p < 0.001$, $\eta_p^2 = 0.015$) and the non-loss/efficacy-present conditions ($p < 0.001$, $\eta_p^2 = 0.015$), as well as greater willingness-to-pay through both the dichotomous-choice method (gain/efficacy-present: $p = 0.004$, $\eta_p^2 = 0.009$; non-loss/efficacy-present: $p = 0.001$, $\eta_p^2 = 0.013$) and the open-ended method (gain/efficacy-present: $p = 0.007$, $\eta_p^2 = 0.008$; non-loss/efficacy-present, $p = 0.003$, $\eta_p^2 = 0.009$). In contrast, those in the loss/efficacy-absent condition expressed neither stronger pro-policy attitudes nor greater willingness-to-pay than those in the gain/efficacy-absent condition or the non-loss/efficacy-absent condition (all ps ≥ 0.052, η_p^2s ≤ 0.004).

Comparing the two loss-framed conditions reveals the benefit of efficacy statements for loss framing: The loss/efficacy-present condition yielded stronger pro-policy attitudes ($p < 0.001$, $\eta_p^2 = 0.032$) and greater willingness-to-pay than the loss/efficacy-absent condition (dichotomous-choice willingness-to-pay: $p < 0.001$, $\eta_p^2 = 0.028$; open-ended willingness-to-pay: $p < 0.001$, $\eta_p^2 = 0.019$). Unlike loss framing, gain and non-loss framing did not benefit from efficacy statements (all ps ≥ 0.285, η_p^2s ≤ 0.001 in pro-policy support and willingness-to-pay). Additionally, while the loss/efficacy-absent condition was perceived as the weakest message (all ps ≤ 0.01, η_p^2s ≥ 0.007), the loss/efficacy-present condition was perceived as the strongest message (all ps ≤ 0.006, η_p^2s ≥ 0.008).

Overall, the loss/efficacy-present condition produced stronger pro-policy attitudes and greater willingness-to-pay than all other conditions, none of which differed from each other (except the gain/efficacy-present condition producing greater dichotomous-choice willingness-to-pay than the loss/efficacy-absent condition: $p = 0.026$, $\eta_p^2 = 0.005$). Thus, we found no evidence for differences in policy support among conditions without efficacy statements (RQ1) or between gain and non-loss frames (RQ2a).

4.2. Impact of Goal Framing on Mediators Predicting Policy Support

As expected, loss frames induced more fear and perceived threat (Table 1) than did gain frames and non-loss frames (all ps ≤ 0.001, η_p^2s ≥ 0.012). The means of hope, perceived collective efficacy, and message processing (Table 1) clarify why loss frames required an efficacy statement to be more persuasive than positive frames. Participants in the loss/efficacy-absent condition felt less hopeful (all ps ≤ 0.001, η_p^2s ≥ 0.013) and perceived less collective efficacy (all ps ≤ 0.015, η_p^2s ≥ 0.006) than those in all other conditions, whereas participants in the loss/efficacy-present condition only felt less hopeful than

those in the gain/efficacy-present condition (p = 0.031, η_p^2 = 0.005) and perceived as much collective efficacy as the gain and non-loss conditions (all ps $\geq$ 0.161, η_p^2s $\leq$ 0.002). Moreover, the loss/efficacy-absent condition produced less message processing than the loss/efficacy-present condition (p < 0.001, η_p^2 = 0.018), which was processed more deeply than any other condition (all ps $\leq$ 0.005, η_p^2s $\geq$ 0.009).

Table 1. Adjusted Means (and Standard Errors) of Mediators, Policy Support, and Perceived Message Strength.

Variables	Efficacy-Present Conditions			Efficacy-Absent Conditions		
	Loss (n = 156)	Gain (n = 156)	Non-loss (n = 155)	Loss (n = 158)	Gain (n = 154)	Non-loss (n = 155)
Mediators						
Perceived threat	5.99_a (0.06)	5.51_b (0.06)	5.58_b (0.06)	5.87_a (0.06)	5.58_b (0.06)	5.58_b (0.06)
Fear	4.56_a (0.11)	3.71_b (0.11)	3.54_{bc} (0.11)	4.25_a (0.11)	3.54_{bc} (0.11)	3.38_c (0.11)
Message processing	5.36_a (0.08)	5.03_b (0.08)	4.84_{bc} (0.08)	4.89_{bc} (0.08)	4.67_c (0.08)	4.78_c (0.08)
Hope	4.66_b (0.11)	5.00_a (0.11)	4.72_{ab} (0.11)	3.94_c (0.11)	4.49_b (0.11)	4.57_b (0.11)
Perceived collective efficacy	4.61_a (0.09)	4.53_a (0.09)	4.44_a (0.09)	4.14_b (0.09)	4.47_a (0.09)	4.45_a (0.09)
Policy support						
Pro-policy attitude	5.77_a (0.08)	5.33_b (0.08)	5.33_b (0.08)	5.12_b (0.08)	5.34_b (0.08)	5.20_b (0.08)
Dichotomous-choice willingness-to-pay	$\$110.63_a$ ($4.39)	$\$92.51_b$ ($4.41)	$\$88.88_{bc}$ ($4.41)	$\$78.63_c$ ($4.36)	$\$86.74_{bc}$ ($4.42)	$\$89.55_{bc}$ ($4.41)
Open-ended willingness-to-pay	$\$177.81_a$ ($9.50)	$\$141.49_b$ ($9.53)	$\$138.33_b$ ($9.53)	$\$120.72_b$ ($9.43)	$\$135.15_b$ ($9.56)	$\$134.79_b$ ($9.53)
Perceived message strength	5.75_a (0.08)	5.43_b (0.08)	5.28_b (0.08)	4.98_c (0.08)	5.33_a (0.08)	5.35_a (0.08)

Note. Cell means lacking shared subscripts differ at p < 0.05. For example, means with subscript a are greater than means with subscript b which are greater than means with subscript c. Means with subscript bc are less than means with subscript a, but do not differ from means with either subscript b or subscript c. All variables were measured on 7-point scales (except willingness-to-pay) and adjusted for political orientation and climate change skepticism covariates.

No mediators differed when comparing between gain and non-loss conditions either with efficacy statements (all ps $\geq$ 0.085, η_p^2s $\leq$ 0.003) or without efficacy statements (all ps $\geq$ 0.361, η_p^2s $\leq$ 0.001; RQ2b).

Mediation Analysis of Pro-Policy Attitude

To examine if the loss/efficacy-present condition produced the strongest pro-policy attitudes through mediation by fear, hope, perceived collective efficacy, perceived threat, and message processing (H2), we tested a moderated mediation model using PROCESS (Model 7; [45]) with frame type (loss vs. gain vs. non-loss) as the independent variable and efficacy statement (present vs. absent) as the moderator.

When comparing conditions with efficacy statements (Table 2), the loss/efficacy-present condition produced stronger indirect effects through perceived threat, fear, and message processing on pro-policy support than the gain/efficacy-present and non-loss/efficacy-present conditions. Moreover, the loss/efficacy-present condition produced indirect effects through hope and perceived collective efficacy that were no weaker than the gain/efficacy-present and non-loss/efficacy-present conditions, except through hope, relative to the gain/efficacy-present condition.

Unlike the loss/efficacy-present condition, the loss/efficacy-absent condition produced weaker indirect effects through both hope and perceived collective efficacy as well as equal indirect effects through message processing relative to the gain/efficacy-absent and non-loss/efficacy-absent conditions (Table 2). Directly comparing the loss/efficacy-present condition against the loss/efficacy-absent condition reveals that adding an efficacy

statement to the loss frame strengthened indirect effects through message processing, hope, and perceived collective efficacy (presented separately in Figure 1).

Table 2. Relative Indirect Effects of Framing Conditions with (Standard Errors) and [95% Confidence Intervals] on Pro-Policy Attitude.

Mediators	Efficacy Statement	Loss vs. Gain Frames		Loss vs. Non−Loss Frames	
		Indirect Effect	**95% CI**	**Indirect Effect**	**95% CI**
Perceived threat	Present	**0.14 (0.03)**	**[0.07, 0.21]**	**0.11 (0.03)**	**[0.06, 0.18]**
	Absent	**0.08 (0.03)**	**[0.03, 0.14]**	**0.08 (0.03)**	**[0.03, 0.14]**
Fear	Present	**0.04 (0.02)**	**[0.01, 0.09]**	**0.05 (0.02)**	**[0.01, 0.10]**
	Absent	**0.03 (0.02)**	**[0.005, 0.07]**	**0.04 (0.02)**	**[0.01, 0.09]**
Message processing	Present	**0.09 (0.03)**	**[0.03, 0.16]**	**0.15 (0.04)**	**[0.08, 0.23]**
	Absent	0.06 (0.04)	[−0.01, 0.13]	0.03 (0.03)	[−0.04, 0.10]
Hope	Present	**−0.06 (0.03)**	**[−0.12, −0.01]**	−0.01 (0.03)	[−0.07, 0.04]
	Absent	**−0.10 (0.03)**	**[−0.17, −0.04]**	**−0.11 (0.04)**	**[−0.19, −0.05]**
Collective efficacy	Present	0.01 (0.01)	[−0.02, 0.04]	0.02 (0.01)	[−0.01, 0.05]
	Absent	**−0.04 (0.02)**	**[−0.08, −0.01]**	**−0.04 (0.02)**	**[−0.08, −0.01]**

Note. Indirect effects are unstandardized beta coefficients relative to loss framing. Thus, positive (negative) coefficients indicate that loss framing has stronger (weaker) indirect effects. Standard errors and 95% confidence intervals use percentile bootstrapping with 10,000 samples. Indirect effects are adjusted for political orientation and climate change skepticism covariates. Indirect effects in boldface have confidence intervals excluding zero.

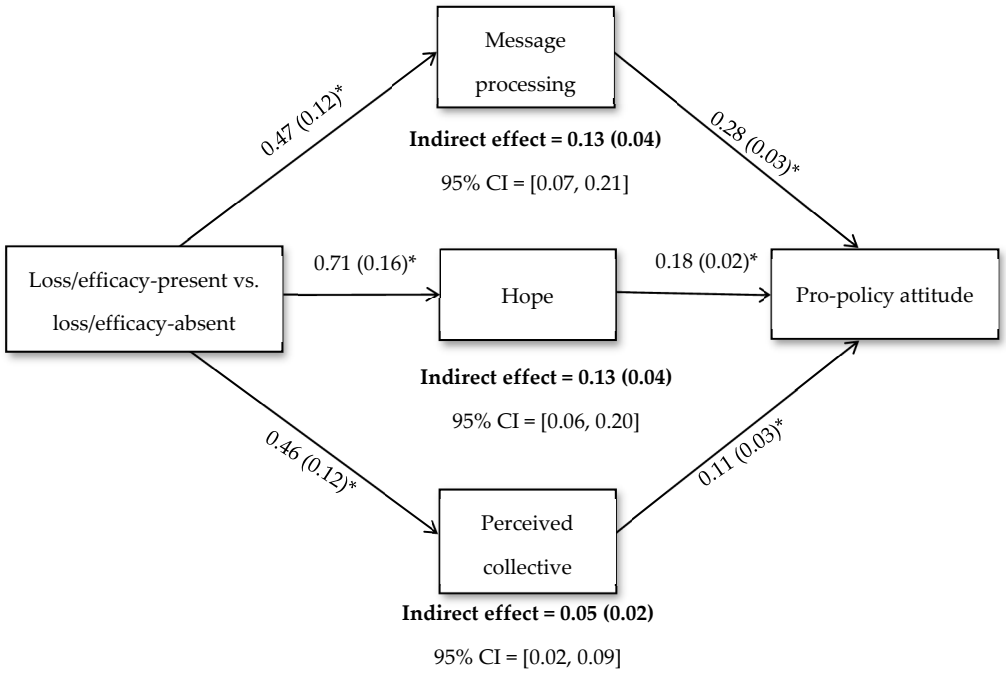

Figure 1. Comparison of unstandardized indirect effects of the loss/efficacy-present condition versus the loss/efficacy-absent condition. Positive coefficients indicate stronger indirect effects through the loss/efficacy-present condition. Political orientation and climate-change skepticism are included as covariates. Standard errors are within parentheses. 95% confidence intervals use percentile bootstrapping with 10,000 samples. Non-significant pathways through perceived threat and fear are not shown in the figure. * $p < 0.001$.

Supplementary File S2 includes a mediation analysis with willingness-to-pay as the dependent variable (which yields similar results) and a correlation matrix.

5. Conclusions

Applying fear appeals as an alternative theoretical framework for goal-framing research, we found that loss frame augmented with an efficacy statement yielded the strongest support for climate-change policy. When efficacy statements were omitted, loss framing was no better than the less threatening positive frames. Therefore, H1 is supported.

Our mediation analysis also sheds light on why loss-framed message required an efficacy statement to produce more policy support than positive frames. We found that the stronger pro-policy attitudes and willingness-to-pay by loss framing with an efficacy statement is mediated by (a) greater fear and perceived threat than gain and non-loss condition; (b) greater hope and perceived efficacy than loss framing without an efficacy statement; (c) deeper message processing than gain and non-loss frames. These results thus support H2.

We also found that without efficacy statements, each goal frame (gain, non-loss, and loss) was indifferent in producing pro-policy attitudes and willingness-to-pay (RQ1). With or without efficacy statements, gain and non-loss frames did not differ in policy support (RQ2a) because gain and non-loss frames did not differ meaningfully in the five mediators that *predicted* policy support (RQ2b).

6. Discussion and Implications

6.1. Support for Using Fear Appeal Theory to Understand Goal Framing

Despite over thirty years of research, theory-based explanations of goal framing remain limited, with little advancement since meta-analyses revealed scant support for the dominant risk-framing hypothesis [7,8]. Thus, our first goal was to test the EPPM of fear appeals [13] as an alternative theoretical framework for goal framing in the sustainability domain. By doing so, we conceptualized loss frames as fear appeals, and therefore as messages requiring efficacy statements to be most persuasive [17]. Consistent with the EPPM's central tenet that persuasion is greatest when consumers perceive both high threat and high efficacy, consumers expressed the strongest climate-change policy support when exposed to a more threatening loss frame augmented with an efficacy statement. Critically, however, loss framing was no better than the less threatening positive frames when efficacy statements were omitted. These results mirror studies that tested climate change fear appeals and found high-threat/high-efficacy conditions more persuasive than low-threat or low-efficacy conditions [46,47]. Given that an efficacy statement was critical to the success of loss framing, we recommend future pro-environmental goal framing studies include efficacy statements (or better, test conditions including them against conditions excluding them).

We also make important contributions to the sustainability and marketing literature by clarifying when loss frames are more persuasive than positive frames in communicating pro-environmental policy. Previous work has demonstrated that loss frames are more persuasive than gain frames under certain circumstances [5,10–12,48,49]. We extend the literature by empirically testing efficacy statements, as suggested by White et al. [17]. Our findings assist marketers and public policy makers in maximizing persuasiveness of messages designed for future pro-environmental communications if loss frames are used.

Our second goal was to more fully evaluate the validity of applying the EPPM to goal framing by testing key EPPM constructs as mediators. Our mediation analysis helps explain why loss framing required an efficacy statement to produce more policy support than positive frames. Without an efficacy statement, loss framing induced less perceived collective efficacy and hopefulness, both of which indirectly lessened policy support. Additionally, while loss framing may have the potential to produce greater policy support through deeper message processing than gain and non-loss frames, our results suggest loss framing requires an efficacy statement to do so. Conversely, with an efficacy statement, loss framing successfully balanced indirect effects through reinforcing hope and perceived collective efficacy with indirect effects through reinforcing fear and perceived threat. All other conditions lacked one side of this successful balance and had weaker indirect effects

through message processing. Positive frames lacked the critical ingredients of fear and threat, whereas loss frames without an efficacy statement lacked the critical ingredients of hope and collective efficacy. In other words, without efficacy statements, neither loss frames nor positive frames integrate all components of successful fear appeals. This reason may explain why positive conditions and the loss/efficacy-absent condition did not differ in policy support (RQ1), and, at least partially, why meta-analyses found null results between goal frames [7,8].

The mediation analysis also helps explains why gain and non-loss frames did not differ in policy support (RQ2a); gain and non-loss frames did not differ meaningfully in the five mediators that *predicted* policy support either (RQ2b). Nonetheless, future research should still distinguish gains from non-losses. For example, in applying regulatory focus theory to goal framing, Cesario et al. [3] theorize and demonstrate how gain and non-loss frames are distinct—a finding replicated in climate-change goal framing [50]. A fruitful direction for future research may be to integrate regulatory-focus and fear appeal theories. Although we focused on fear appeal theory, gain and non-losses frames are certainly more than just indiscriminate variants of a weak fear appeal.

Lastly, although excluded from mediation, differences in perceived message strength suggest reactance may be another underlying process affected by efficacy statements. With an efficacy statement, loss framing was perceived as the strongest message, but without an efficacy statement, loss framing was perceived as the weakest message. This pattern may reflect message derogation, a common expression of reactance [36]. Although we tried to minimize reactance provoked by controlling language (the fourth confound outlined), fearful messages lacking efficacy information may still provoke reactance [13]. Indeed, a handful of goal-framing studies have found greater reactance in loss frames than gain frames (e.g., [51]). But could efficacy statements minimize this reactance? Future research should therefore test reactance as a mediator subject to moderation by efficacy statements.

6.2. Tightening Methodological Control in Goal Framing Research

Applying the EPPM offers promise in reconciling the inconsistent findings of goal-framing research, but fulfilling that promise requires tighter methodological control. Foremost, the critical role of efficacy statements in the present study underscores the importance of the third confound we outlined: inconsistent efficacy information. Like fear appeals, efficacy statements may determine whether a loss frame achieves optimal or suboptimal persuasiveness. Researchers may therefore wish to carefully control how much efficacy information they include within framed messages and to measure perceived efficacy post-manipulation. A loss frame describing achievable and effective solutions likely has different effects than a loss frame lacking such efficacy information. Making this difference between loss frames explicit may help resolve divergent findings.

More generally, we encourage researchers to exert tighter control over non-framed message components, which possibly cause independent or interactive effects that cannot be attributed specifically to goal framing. This general issue of uncontrolled additional components is also illustrated by the first confound we outlined: mislabeled and mixed frames. Gain frames often mix in additional components depicting losses, whether they be negated losses (i.e., non-loss frames) or other threatening components such as images of climate change impacts or introductory text about climate change. Similarly, loss frames often mix in additional optimistic or positive content. Although mixing positive content (to reinforce hope and perceived efficacy) with negative content (to reinforce fear and perceived threat) makes for effective messages, we suggest additional positive or negative components are best discussed explicitly and systematically manipulated. Controlling these additional message components should help produce the reliable findings needed to build a coherent theoretical account of goal framing. To that end, researchers may also reduce unintended variability arising from *within* framed components by ensuring goal frames describe the *same* outcomes with the *same* phrasing (i.e., they minimize the second common confound of nonequivalent frames) and by minimizing disparities in controlling

language (the fourth common confound outlined) between goal frames (e.g., avoiding a loss frame phrased with "if you REFUSE to . . . " when the positive frame is phrased with simply "if you . . . ").

7. Limitations and Recommendations for Future Research

First, as seen in the policy support differences among conditions (Table 1), we observed small effect sizes. However, loss frames outside the laboratory may produce stronger effects by evoking greater fear and perceived threat. In our study, we could not use particularly evocative language because all loss-framed outcomes required recasting into logically equivalent gain-framed outcomes. Moreover, our message's plain text is less evocative than audiovisual media or speech. With that said, as loss frames become more fearful or threatening, competing effects may emerge. For one, there comes a greater need to maintain hope and efficacy, but a greater difficulty in doing so; more fearful loss frames, such as those in fictional disaster films or documentaries emphasizing apocalyptic consequences, may convey climate change as a hopeless and intractable crisis, leaving audiences disempowered and disengaged [52]. Additionally, more fearful loss frames may provoke greater reactance and thus motivate the ignoring, rejection, or denial of climate-change threats. Minimizing reactance is particularly needed when discussing climate-change "push policies," which themselves provoke reactance by restricting freedom to perform anti-environmental behavior [53]. This appears especially relevant among audiences either more politically conservative or skeptical of climate change than our sample. Such audiences may exhibit reactance when asked about climate change even without reading a message beforehand [54]. For these reasons, the success of combining loss framing with an efficacy statement in this study cannot be generalized to support the unqualified use of loss frames, irrespective of loss severity and audience beliefs. In addition, audience beliefs might vary across cultures and countries. It would be interesting to understand how loss frames are perceived in other countries where climate change attitudes and beliefs might differ and overall norms of messaging might be quite different (e.g., India, China, Russia).

Second, it should be noted that fear appeal theory was developed to explain how consumers respond to *personal* threats rather than global threats that affect countless *other* species and individuals, as does climate change. Given this severe threat to *others*, climate-change loss frames may evoke greater compassion or empathy for others than positive frames evoke (as suggested by the empathy-prospect model, [55]). This may be an important factor (among others) that fear appeal theory does not account for, but which nevertheless contributes to the persuasiveness of climate-change loss frames and should be examined in future research.

A final limitation worth noting involves potential unintended effects from the introductory text describing the carbon policy and its benefits (e.g., developing greenspace and public-transit infrastructure). Although participants knew the policy was imaginary, by describing solutions and benefits, the policy description may have elicited hope or bolstered efficacy perceptions. If instead the loss/efficacy-absent condition lacked a policy description, it may have been less effective than the positively framed conditions rather than equally effective. Thus, while we acknowledge the difficulty in fully controlling all message components, we still recommend that researchers strive not only to develop an alternative theory to the risk-framing hypothesis, but to also design tightly controlled studies with measures sensitive to possible unintended effects (e.g., reactance, changes in perceived efficacy). If unreliable effects persist from message content confounds, it may remain difficult to offer framing advice to climate change communicators. We hope this study offers direction for developing sound goal-framing explanations and recommendations for communicators both through theory (further testing of the EPPM and its related mediators) and design (greater control of message confounds).

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su14127411/s1, File S1: Message stimuli and Survey Instrument, File S2: Correlation matrix, WTP, and ANCOVA, File S3: Pairwise comparisons.

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