

Numbers vs. Words: Investigating the Impact of Environmental Information Format on Supporting Environmental Policies

Abstract: Across four studies, we show that providing information about environmental issues in quantitative (versus qualitative) format enhances individuals' support for environmental policies. Our findings show that the increase in environmental policy support when receiving quantitative information is because of an increase in evaluating the importance of environmental issues. We rule out alternative explanations for this effect and propose a boundary condition. Our findings further show that quantitative information significantly motivates individuals with low consideration of future consequences to show higher support for environmental policies. This paper has important theoretical and practical implications for environmental policy promotion.

Keywords: Quantitative Information, Qualitative Information, Environmental Policy Support, Consideration of Future Consequences, Pro-environmental Behavior, Experiment

Introduction

Quantitative, i.e., numerical and qualitative, i.e., verbal/non-numerical, representations of attribute values are used interchangeably in life (VanEpps et al. 2016; Keane and Smith 2015). However, do they impact individuals' attitudes and behaviors similarly? In this research, we intend to investigate the impact of quantitative (vs. qualitative) information about environmental issues on individuals' support for environmental policies. We further intend to contribute to the related literature by investigating a mediation mechanism for this effect and a moderator as a boundary condition.

Climate change challenges have led to the introduction of sustainable development goals and public policies, by the UN and other policymakers around the world, in order to mitigate the future consequences of climate change (Islam et al. 2021). Public policies can initiate changes in societies and stimulate pro-environmental behaviors in individuals (Prothero et al. 2011). However, existing research shows that the success of environmental policies in alleviating the environmental issues depends on individuals' acceptance and support of policies (Emilsson 2022; Jansson & Rezvani 2019; Steg & Vlek 2009; Stern 2000). Many environmental policies have failed to reduce or eliminate the environmental problems such as landfill pollution (Yin et al. 2022) due to the lack of individuals' support. It is thus important to investigate how individuals' policy support can be enhanced.

Communicating information about environmental issues is essential to attract the support of individuals for environmental policies (Yin et al. 2022). Information about environmental issues are communicated both in quantitative (“...annually, 80% of plastic disposals get into the oceans...”) and qualitative (“ ... annually, a large percentage of plastic disposals get into the oceans...”) formats (Alcamo 2008). Little is known about how presenting quantitative vs

qualitative information on environmental issues influences individuals' support for environmental policies that aim to reduce or eliminate environmental issues. This is an important gap to address because it not only sheds light on the antecedents of environmental policy support as a pro-environmental behavior, but it also contributes to the improvement of environmental policy promotion. Our paper intends to fill this gap.

Theoretical Background

The existing research on the effectiveness of communicating information in either quantitative (i.e. numerical) or qualitative (i.e. verbal) format is limited and contains contradicting results. Some studies have argued that numerical information is more difficult to process than verbal information (Yalch and Elmore-Yalch 1984). While other studies have found the opposite (Viswanathan and Childers 1996) and argue that a higher level of specificity provided by quantitative descriptors is normatively desirable as it makes the claims more accessible for critical analysis (O'Keefe 2007).

The results of some studies suggest that the processing of information is easier when it is represented in number (versus verbal) format. For example, the results of Atwater and Brett (2006) showed that providing numerical information like scores was more positively regarded than providing the same information but in the linguistic format. According to this stream of research, quantitative descriptors provide greater specificity to evidence, which makes empirical claims more accessible for critical scrutiny (O'Keefe 2007; Peters et al. 2014).

On the other hand, some studies posit that numbers can be difficult to evaluate since they are abstract symbols, and context can alter their meaning (Peters 2012; Peters et al. 2009). Verbal information seems to be easier to process and understand compared to numerical information

(Peters et al. 2009). The findings of Peters et al. (2009) showed that individuals may not use numerical data in decision making until they are used to compare available data to determine their affective meaning or until evaluative categories are used to give meaning to the data.

The third group of studies show no meaningful difference between the numerical and verbal representations of information. For example, the results of a meta-analysis by O'Keefe (1998) did not show a reliable significant effect of numerical information on persuasiveness. This meta-analysis concludes that there was no statistical significance observed for quantitative specificity, i.e., numerical versus verbal representation of information, welcoming additional research on this area (O'Keefe 1998). In another study, Keane and Smith (2015) found no difference in the perception of environmental issues when the information about those issues were communicated through numerical or non-numerical representations (graphs). Similarly, and more recently, Liu et al. (2021) could not find a difference between neither the speed and the effort of processing information nor in the accuracy and performance of decision making when individuals used numerical versus verbal information. Nevertheless, they showed that when using verbal quantifiers, the context influenced those decisions more strongly, when compared to using numerical quantifiers (Liu et al. 2021).

Regardless of the disparity in previous studies' results, there seems to be an agreement in the literature regarding different types of processing information when the presentation of information changes in format. For example, Huber (1980) presented participants with two types of ratings: numbers (for example, "5" on a 7-point numeric scale) and words (for instance, "good" on a 7-word linguistic scale). His study found that participants applied different decision-making strategies so that direct comparisons (e.g., calculating differences or determining the maximum value of a set of numbers) were more frequently used when participants were given numerical

data, whereas evaluative statements (e.g., "this applicant has very good qualifications") were more frequently used when participants were given linguistic data (Stone and Schkade 1991). Information presentation can affect decision strategy selection by affecting how much effort is required to execute cognitive operations. It may be easier to compute differences within attributes with numbers (e.g., 640K of memory is 128K more than 512K) than with words (e.g., what is the difference between an "excellent" memory capacity and a "good" one?) (Stone and Schkade 1991). Furthermore, studies showed that information search with numbers becomes more attribute-based over time, whereas with words, alternative-based information search is dominant (Stone and Schkade 1991).

In the field of environmental issues and consumers' pro-environmental behavior, research has rarely examined the impact of the format in which information about environmental issues is presented on the degree to which individuals support environmental policies. In 2013, Hart (2013) showed that receiving numeric information about the environmental issue increases the intention to donate to the related cause, but only for individuals with high numeracy skill. This was the result of only one experiment study and limited to the context of climate change's effect on polar bears. In another related study, Myers et al. (2015) showed that using numbers versus verbal information helped individuals to perceive higher scientific agreement about climate change issues.

We continue this line of research in four avenues: 1. Suggesting a mechanism for the impact of quantitative versus qualitative information about environmental issues, 2. Proposing a moderator as a boundary condition for this impact and 3. Providing further support for the higher impact of quantitative versus qualitative information about environmental issues on individuals' support for related pro-environmental policies in four experiments and using various

manipulations and contexts 4. Ruling out alternative explanations for the impact of quantitative versus qualitative information about environmental issues.

We propose that receiving quantitative, i.e. numerical, versus qualitative, i.e. verbal/non-numerical, about an environmental issue, will increase the support of individuals for the pro-environmental policies tackling those issues. We build our proposition on the results of Peters et al. (2014), where they found that the comprehension of the risk of drugs were easier for individuals when information about those risks were communicated to them using numbers versus words, regardless of their numeracy skills. In line with these findings, we expect that using quantitative (versus qualitative) information about environmental issues helps individuals to better process the magnitude of environmental crises, the risk they pose and their long-terms adverse effects. Hence, we expect individuals to be more likely to support policies that intend to tackle those environmental issues. Particularly, we hypothesize that:

H1: Receiving quantitative information compared to qualitative information about environmental issues increases individuals' support for environmental policies.

Previous studies have highlighted the role of Granularity Effect in evaluating different information formats (Zhang & Schwarz 2012). These studies suggest that the confidence in information is higher when information format is more fine-grained rather than coarse-grained, e.g., 52 weeks versus 1 year (Zhang & Schwarz 2012). Furthermore, the likelihood that individuals believe that a company or product will deliver on its promise increases when the promise is conveyed in fine-grained terms rather than coarse ones (Zhang & Schwarz 2012).

We build on the findings of studies on granularity effect and propose that quantitative information has a finer-grained format compared to qualitative information. Furthermore,

quantitative information conveys a higher level of factualness compared to qualitative information (Thorne et al. 2006). Accordingly, we propose that presenting environmental issues using quantitative format increases the evaluation of the importance of those environmental issues, when compared to qualitative information. When individuals evaluate environmental issues as more important and critical, they will be more likely to support the policies that intend to overcome those environmental issues. Hence, we hypothesize that:

H2: Individuals attribute higher importance to environmental issues when they receive quantitative (versus qualitative) information about environmental issues.

H3: The evaluation of importance of environmental issues mediates the impact of receiving quantitative (versus qualitative) information on the environmental policy support.

Considering future consequences (CFC), as an individual's characteristic, measures the perceived relationship between current behavior and future outcomes (Strathman et al. 1994). Studies showed that higher level of CFC is associated with higher preferences for options with long-term benefits and immediate costs as opposed to those with long-term costs and immediate benefits (Joireman et al. 2005, 2008). Earlier studies showed that CFC is an important factor regarding environmentally responsible behavior (Bruderer Enzler 2015; Yasir et al. 2021). Specifically, these studies suggest that mainly considering immediate (versus future) consequences of current behavior is correlated with less concern for environmental issues and less environmentally responsible behavior.

Building on the results of previous studies, we propose that CFC provides a boundary condition for the impact of quantitative information on environmental policy support so that our proposed effect is working only for individuals with low CFC and will not impact individuals with

high CFC. Individuals who can well envision, consider, and prioritize future consequences of their behavior, i.e., with high CFC scores, will attribute high importance for environmental issues and hence will show good support for environmental policies, which their impacts will mainly be revealed in future rather than immediate time, no matter if they receive quantitative or qualitative information. Therefore, we hypothesize that:

H4: The higher impact of quantitative (versus qualitative) information on the individuals' support for environmental policies only exists for the individuals with low (as opposed to high) CFC.

We have summarized our hypothesized relationships in figure 1. research model.

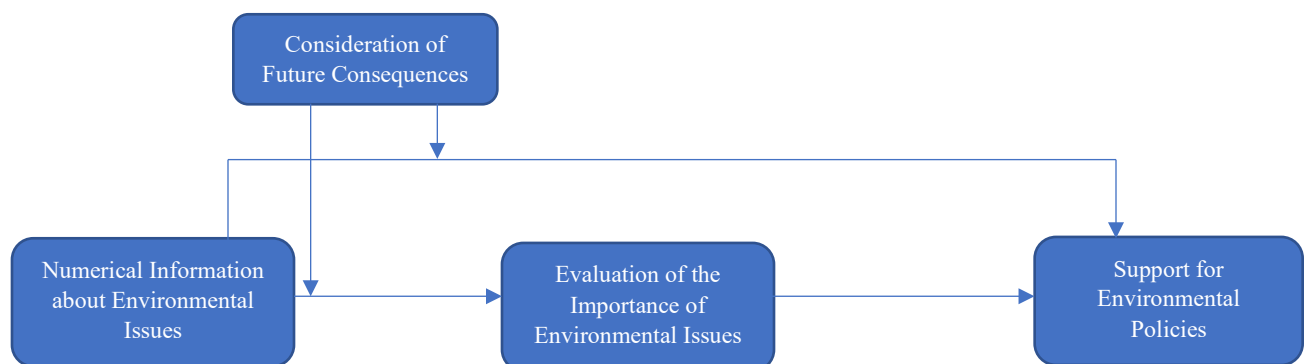


Figure1: Research Model

Methods

We tested our research model (Figure 1) across four studies. Studies 1-1 and 1-2 test Hypothesis 1 and provide support for the main effect of information format on environmental policy support. Next, Study 2 establishes the mediation role of perceived importance of

environmental issue (H2 and H3). Study 3 tests the whole model and provides support for the moderating role of consideration of future consequences (H4).

Study 1-1

Design and Procedure. Study 1-1 tested the main effect (H1). We randomly assigned three hundred and eighty two participants (72% female, average age of 25) on the Prolific website to any of the two conditions of quantitative vs. qualitative information. The participants in the quantitative (qualitative) conditions read a text that included numbers and statistics (no numbers, only qualitative qualitative information). The participants in the quantitative (qualitative) condition read” *One fossil fuel car emits 5 tons (tons and tons) of CO2 in a year. As a result, considering the current total number of fossil-fueled cars, 8.2 billion tons of CO2 is released (CO2 emissions are increasing immensely) in the atmosphere every year. Rising CO2 emissions are linked to increased risks for respiratory infections, cardiovascular disease, asthma, and stress, to name a few.*” Next, we informed participants that their country has set a goal to become fossil fuel free in transport by 2040. The policy was described as one that would imply cars to run on non-fossil fuels, the so-called alternative fuels, such as electricity, ethanol, biogas, and hydrogen. Participants indicated the degree to which they support this goal using a Likert scale (1 (not at all) to 7 (very much)). As an attention check question, participants wrote three consequences of co2 emission that they read in the magazines’ excerpt.

Analysis and Findings. We removed the answers of fifteen participants who did not provide correct answers to attention check question or did not follow the instructions. The results of ANOVA revealed that participants showed significantly higher level of support for the environmental policy when they received quantitative versus qualitative information about the

environmental issue ($M_{\text{Quantitative}} = 6.63$, $SD = .71$, $M_{\text{Qualitative}} = 6.30$, $SD = 1.12$, $F(1,373) = 10.99$, $p < .01$).

Discussion. The results of Study 1-1 provide preliminary support for H1 and establishes the main effect of receiving different format of information, i.e., quantitative versus qualitative, regarding environmental issues on the degree of environmental policy support.

Study 1-2

Study 1-2 replicates the results of Study 1-1 and provides additional support for H1 by adopting a new stimulus on ocean plastic pollution. This study tested some alternative explanations for our results. Specifically, Study 1-2 tested if our main effect is a function of numeracy skill of participants. Furthermore, one alternative explanation for our results in Study 1-1 is that participants may have evaluated the information in the quantitative condition (versus the qualitative condition) as more precise. Previous studies showed that higher level of preciseness of information, for example 49.8% versus 50%) can positively influence evaluation and behavioral intentions by increasing how much individuals trust that information (Kim et al. 2021). Study 1-2 looks at the role of preciseness in our results.

Pre-test. One hundred and nineteen participants on an online panel website completed this pre-test. We randomly assigned participants to either the quantitative or qualitative information conditions. In the quantitative (qualitative) condition, the participants read a paragraph with quantitative information (no numbers, only qualitative information) on ocean plastic pollution and its impact on marine life. The participants in the quantitative (qualitative) condition read”
According to governmental reports, every day approximately 8 million (millions of) pieces of plastic pollution find their way into our oceans. Approximately 5,000(thousands of) items of marine plastic pollution have been found per mile of beach. One hundred thousand [100,000]

(many) marine mammals and turtles and 1 million (many) sea birds are killed by marine plastic pollution annually. Less than a third (a small portion) of all plastic is recycled. Plastic production has been forecast to grow by 60% by 2030 and to treble by 2050 (to grow increasingly by 2030 and 2050)".

After reading the paragraph, we asked participants to indicate how they evaluate the preciseness of the information provided to them in the paragraph, how they evaluate the accuracy of the information provided to them in the paragraph and how much they trust the information provided to them in the paragraph (1 (not at all) to 9 (very much)). We analyzed the results using ANOVA. The results of ANOVA showed no significant impact of using quantitative (versus qualitative) information on the evaluation of preciseness ($M_{\text{Quantitative}} = 6.91$, $SD = 1.34$, $M_{\text{Qualitative}} = 6.98$, $SD = 1.47$, $F(1, 113) = .06$, $p = .79$), accuracy ($M_{\text{Quantitative}} = 6.91$, $SD = 1.24$, $M_{\text{Qualitative}} = 6.91$, $SD = 1.26$, $F(1, 113) = .00$, $p = .98$) or trustworthiness ($M_{\text{Quantitative}} = 7.27$, $SD = 1.18$, $M_{\text{Qualitative}} = 7.12$, $SD = 1.20$, $F(1, 113) = .42$, $p = .51$) of the information.

Design and Procedure. Two hundred individuals (64% female, average age of 35) on the Prolific website were randomly assigned to the quantitative or qualitative conditions. They read the same paragraphs as in the pre-test. Next, we informed participants about an environmental policy aiming to reduce plastic pollution by stopping the use of single-use plastic. We asked participants to indicate the degree to which they support this policy on a Likert scale (1 (not at all) to 7 (very much)). Afterwards, participants answered questions on numeracy skills. We used a subjective numeracy skill measure (adapted from Fagerlin et al. 2007) to measure the numeracy skill of participants. In six questions and using Likert scale (1 (not at all) to 9 (very much)), we asked participants how good they are at working with fractions, percentages, calculating tips, calculating discounts, tables and figures and quantitative information in general. Furthermore, as

manipulation check question, we asked participants to indicate how much they think the paragraph that they read at the beginning of the survey contained quantitative information (1 (not at all) to 7 (very much)). Finally, as an attention check, participants choose four words that they saw in the opening text among eight related and unrelated words.

Analysis and Findings. We removed the answers of twenty participants who did not provide correct answers to attention check question or did not follow the instructions. Our manipulation check confirmed that the text in quantitative condition was perceived to have more quantitative information compared to the text in qualitative condition ($M_{\text{Quantitative}} = 5.74, SD = 1.13, M_{\text{Qualitative}} = 3.68, SD = 1.45, F(1, 178) = 112.9, p < .01$). Supporting H1, the participants who read the text about environmental crisis that contained quantitative information showed significantly higher support for the environmental policy compared to the ones who read the text that contained qualitative information ($M_{\text{Quantitative}} = 6.52, SD = .99, M_{\text{Qualitative}} = 6.18, SD = 1.11, F(1, 178) = 4.48, p = .03$).

Next, we averaged the answers of each participant to numeracy skill questions and computed a single score for numeracy skill for each participant. A higher score shows better numeracy skills. Entering numeracy skill as a covariate did not change the significant impact of quantitative information on environmental policy support ($F(1, 177) = 4.64, p = .03$). The effect of numeracy skill on environmental policy support was not significant ($F(1, 177) = 1.02, p = .31$).

Discussion. This study replicates the results of Study 1-1. Using two different stimuli, Studies 1-1 and 1-2 provide support for H1 and suggest higher support for environmental policies after receiving quantitative (versus qualitative) information about environmental issues. Furthermore, the results of our pre-test rule out alternative explanations that using numbers might have increased the support for environmental policies due to increase in preciseness, accuracy, or trustworthiness of information.

Study 2

Study 2 intends to provide support for the mediation role of “importance of environmental issue”. This study suggests that providing information about environmental issues using quantitative (versus qualitative) information increases the importance of the environmental issue for individuals (H2). This increase in importance of environmental issues leads to higher levels of support for the policies that help to tackle those environmental issues (H3).

Design and Procedure. Two hundred individuals (58% female, average age of 43) on the Amazon Mechanical Turk website were randomly assigned to the quantitative or qualitative conditions. We used the same design and procedure as Study 1-2. Additionally, we asked participants to indicate how they evaluate the importance of the issue of plastic pollution in the oceans (1) not at all important to (9) very much important).

Analysis and Findings. We removed the answers of twenty-one participants who did not provide correct answers to attention check question or did not follow the instructions. The results of manipulation check showed that the text in quantitative condition was perceived to have more quantitative information compared to the text in qualitative condition ($M_{\text{Quantitative}} = 5.60, SD = 1.01, M_{\text{Qualitative}} = 4.22, SD = 1.34, F(1,177) = 61.39, p < .01$). Confirming our previous results and supporting H1, we found significantly higher support for the environmental policy in the participants who read the text about environmental crisis that contained quantitative versus qualitative information ($M_{\text{Quantitative}} = 5.76, SD = 1.50, M_{\text{Qualitative}} = 5.23, SD = 1.81, F(1,177) = 4.55, p = .03$). Using the same procedure as the one in Study 1-2, we computed the numeracy skill for participants. We did not find any change in our results after entering numeracy skill as a covariate ($F(1,176) = 4.44, p = .04$). Furthermore, the effect of numeracy skill on policy support was not significant ($F(1,176) = .03, p = .84$).

Supporting H2, our results showed that participants who received quantitative information, evaluated the environmental issue as more important, compared to the ones who received qualitative information ($M_{\text{Quantitative}}= 8.10, SD=1.22, M_{\text{Qualitative}}= 7.60, SD=1.58, F(1,177) = 5.56, p=.02$).

Supporting H3, using the PROCESS (Hayes 2013) model 4, we found a significant indirect impact of information type on policy support through the evaluation of environmental issue's importance (Indirect effect: $-.29, BootSE=.13, LLCI=-.56, ULCI=-.04; \beta_a=-.49, LLCI= -.91, ULCI=-.08; \beta_b =.58, LLCI= .43, ULCI=.73, 5000$ bootstraps, with 95% confidence interval), confirming the mediation role of perceived importance of the environmental issue.

Discussion. The results of Study 2 provide support for H1, H2 and H3. This study confirmed that participants who received quantitative information about environmental issues evaluated those issues as more important, compared to the participants who received qualitative information about those environmental issues. The findings also supported the mediation role of perceived importance of environmental issue in the impact of quantitative (versus qualitative) information on the support that individual show regarding environmental policies.

Study 3

Study 3 tested our full research model (Figure1) and investigated H4 by looking at the moderation role of consideration of future consequences (CFC). Furthermore, this study provided additional support for the main effect by using a new stimulus on deforestation.

Design and Procedure. Two hundred individuals (46% female, average age of 45) on the Amazon Mechanical Turk website were randomly assigned to the quantitative or qualitative conditions. In the quantitative (qualitative) condition, the participants read a paragraph which provided quantitative (qualitative) information on deforestation and its impact on the increase of

co2. The participants in the quantitative (qualitative) condition read” *A new study published in Nature reports that 15.3 billion (billions of) trees are chopped down every year. Based on this study, 46% of the world's (about half of the world's) trees have been cleared over the past years. It is estimated that more than 1.5 billion tons (billions of tons of) of carbon dioxide are released into the atmosphere due to deforestation every year* “. We informed participants that their country is adopting a policy to stop deforestation by 2040. Using a Likert scale, participants indicated the degree to which they support this policy and how they evaluate the importance of the issue of deforestation. Next, participants answered Strathman et al., (1998)’s measure of CFC, consisting of 14 questions. Furthermore, we asked participants to indicate how they evaluate the preciseness of the information provided to them in the paragraph, how they evaluate the accuracy of the information provided to them in the paragraph and how much they trust the information provided to them in the paragraph (1(not at all) to 9(very much)) (the same questions as in pre-test of Study 1-2). We conducted numeracy skill measurement, manipulation check and attention check, similar to Study 2.

Analysis and Findings. We removed the answers of twenty-seven participants who did not provide correct answers to attention check question or did not follow the instructions. Overall, the participants in the quantitative condition perceived the text to have more quantitative information compared to the participants in the qualitative condition ($M_{\text{Quantitative}} = 6.09$, $SD = 1.17$, $M_{\text{Qualitative}} = 4.47$, $SD = 1.49$, $F(1,171) = 63.52$, $p < .01$). In line with H1, our participants showed higher levels of support for the environmental policy when they read a text that contained quantitative information compared to the one that contained qualitative information ($M_{\text{Quantitative}} = 6.41$, $SD = .0.97$, $M_{\text{Qualitative}} = 6.06$, $SD = 1.26$, $F(1,171) = 4.22$, $p = .04$). Supporting H2, the participants who received information about deforestation issue in quantitative condition evaluated

deforestation issue as significantly more important than the ones who received the information in qualitative format ($M_{\text{Quantitative}} = 8.11$, $SD = 1.31$, $M_{\text{Qualitative}} = 7.44$, $SD = 1.79$, $F(1,171) = 7.83$, $p < .01$). The PROCESS version 3.3 model 4 with 5000 bootstraps showed significant indirect effect of quantitative information on policy support through perceived importance of the environmental issue (Indirect effect: $-.38$, $BootSE = .13$, $LLCI = -.65$, $ULCI = -.11$; $\beta_a = .02$, $LLCI = -.18$, $ULCI = .23$; $\beta_b = .57$, $LLCI = .50$, $ULCI = .63$, with 95% confidence interval). This supports H3 and confirms mediation role of perceived importance of the environmental issue.

Next, we computed the numeracy skill for participants using the same procedure as the one in Study 2. Entering perceived numeracy skill as a covariate did not change the impact of quantitative information on policy support ($F(1,170) = 4.21$, $p = .04$) and the impact of numeracy skill on policy support was not significant ($F(1,170) = .01$, $p = .91$). These results rule out the impact of numeracy skill in our findings.

Next, using Strathman et al., (1998) instruction, we calculated a CFC score for each participant. Higher CFC scores mean more consideration of future consequences and less consideration of immediate consequences. Using PROCESS model 1 with 5000 bootstraps, we confirmed the moderation role of CFC (H4) on the impact of information format on policy support ($F(1,169) = 4.08$, $p = .045$, $SE = .013$, $LLCI = .0049$, $ULCI = .049$). To further investigate the role of CFC, we performed spotlight analysis. Consistent with H4, our results showed that the impact of information format on policy support was significant only for individuals with low CFC ($M_{\text{Quantitative}} = 8.11$, $SD = 1.31$, $M_{\text{Qualitative}} = 7.44$, $SD = 1.79$, $F(1,86) = 3.71$, $p = .05$) and not for individuals with high CFC ($M_{\text{Quantitative}} = 6.58$, $SD = .69$, $M_{\text{Qualitative}} = 6.36$, $SD = 1.07$, $F(1,83) = 1.30$, $p = .25$).

Furthermore, we found the same pattern for how participants evaluated the importance of the environmental issue. The results of PROCESS model 1 with 5000 bootstraps, confirmed the moderation role of CFC on the impact of information format on policy support ($F(1,169) = 9.37, p < .01, SE = .018, LLCI = .025, ULCI = .085$) The impact of information format on policy importance was significant only for individuals with low CFC ($M_{\text{Quantitative}} = 8.02, SD = 1.43, M_{\text{Qualitative}} = 6.97, SD = 1.99, F(1,86) = 8.17, p < .01$) and not for individuals with high CFC ($M_{\text{Quantitative}} = 8.21, SD = 1.16, M_{\text{Qualitative}} = 7.88, SD = 1.48, F(1,83) = 1.28, p = .26$).

Furthermore, using PROCESS model 8 with 5000 bootstraps, we confirmed a significant moderated moderation index for our research model (Index: .031, $BootSE = .012, LLCI = .009, ULCI = .05$, 95% confidence interval), where the environmental issue importance mediates the impact of information format on policy support only for the participants with low CFC (For low CFC: Indirect effect: -.59, $BootSE = .20, LLCI = -.94, ULCI = -.25$; For high CFC: Indirect effect: -.18, $BootSE = .17, LLCI = -.49, ULCI = .07$).

We did not find any significant impact of using quantitative (versus qualitative) information on the evaluation of accuracy ($M_{\text{Quantitative}} = 6.40, SD = 1.68, M_{\text{Qualitative}} = 6.00, SD = 1.96, F(1,171) = 2.09, p = .15$) or trustworthiness ($M_{\text{Quantitative}} = 6.22, SD = 2.04, M_{\text{Qualitative}} = 5.98, SD = 2.5, F(1,171) = .57, p = .45$) of the information. Nevertheless, participants evaluated the text in the quantitative condition as more precise compared to the text in the qualitative condition ($M_{\text{Quantitative}} = 6.80, SD = 1.78, M_{\text{Qualitative}} = 5.28, SD = 2.19, F(1,171) = 25.22, p < .01$). To make sure that the impact of information format on policy support is indeed due to the differences in evaluation of environmental issue importance and not the differences in preciseness of information, we re-ran model 4 PROCESS by entering preciseness as a covariate. The results confirmed a significant indirect impact of information format on policy support, even after controlling for the preciseness

of information (Indirect effect: $-.24$, $BootSE=.14$, $LLCI=-.47$, $ULCI=-.13$; $\beta_a=-.44$, $LLCI=-.85$, $ULCI=-.02$; $\beta_b=.56$, $LLCI=.50$, $ULCI=.62$, $\beta_{covariate}=.03$, $LLCI=-.01$, $ULCI=.07$, with 95% confidence interval).

Discussion. Study 3 provides support to our full research model (Figure 1); H1, H2, H3 and H4. The results confirmed that the positive effect of quantitative information format exists only for individuals with low CFC. Individuals with high CFC envision the future consequences of environmental issues well enough to support environmental policies regardless of the format of information that the environmental issues are presented. The findings of Study 3 confirmed that our results are not due to the numerical skills of participants or the differences in terms of perceived preciseness, accuracy or trustworthiness of the information that was provided to participants regarding environmental issues.

Discussion and Theoretical Implications

This research contributes to the studies on the influence of environmental information and knowledge promotion on individual's support for environmental policies. Our research is the first, to our knowledge, to highlight the impact of environmental information format on environmental policy support by providing a mechanism, as well as a boundary condition.

Across four experiments, we found consistent support for our propositions that quantitative information compared to qualitative information about environmental issues can motivate individuals to show higher levels of support for environmental policies. Our research showed that the mechanism for this effect is higher perceived importance of environmental issues after receiving quantitative information. We ruled out the role of numeracy skills in our results. Furthermore, our findings showed that the increase in perceived preciseness, accuracy or

trustworthiness of information could not be an alternative explanation for the positive influence of using quantitative versus qualitative information on supporting environmental policies.

Furthermore, our findings suggest CFC as a boundary condition for our propositions, so that quantitative information only motivates individuals with low CFC to show better support for environmental policies. The format in which the information about environmental issues is presented does not seem to impact the way individuals with high CFC attribute importance to environmental issues and show support for sustainable policies. We believe that this finding is due to general high concern of individuals with high CFC for environmental issues and policies (Bruderer Enzler 2015; Yasir et al. 2021), as the consequences for these issues and policies are mainly to be achieved in future, which individuals with high CFC highly consider in their judgement and decision making. These findings contribute to the previous research (i.e., O'Keefe 2007) on information format and information processing which, as discussed in the theoretical background, showed an agreement on differences in processing of information in individuals who are exposed to quantitative or qualitative information.

Limitations and Future Research

Future research can investigate the role of emotions in our proposed effects. For example, previous studies showed that individuals may experience “collective guilt” as a result of receiving information about county-level environmental footprint (White et al. 2019). Future studies may investigate the role of such emotions in individuals’ support for environmental policies and how they play a role in differential impact of quantitative versus qualitative information. This will help to provide further suggestions for how to communicate more effectively about environmental issues and related policies.

Another avenue for future research is the role of cultural differences. Evidence exists on how different cultures process quantitative versus non-numerical information differently. For example, Fairchild (2012) found significant difference on answering questions using numeric versus verbal scales in participants from Canada, Philippine, USA and the UK. Future studies may investigate how cultural differences could change our findings on the effect of quantitative versus qualitative information about environmental issues on supporting environmental policies.

Our research is limited as we only included numeracy skills as a control factor. Future research can look into the roles of science literacy and environmental literacy (White et al. 2019) to investigate further boundary conditions. Our proposed effects may work in a U-shaped pattern, meaning that the information format does not influence individuals with very low or very high knowledge about environmental issues but influences general population with medium level of environmental literacy.

Another limitation of our research is that we did not look into the participants' political ideology. Previous studies showed that compared to left-oriented individuals, right-oriented individuals have significantly lower climate change beliefs and concerns (Clayton et al. 2015). Our proposed effect may become stronger for individuals with right compared to left political ideologies, as left-oriented individuals already envision the consequences of the environmental issues and support environmental policies. Future studies may explore the potential effect of political ideology on our proposed research model.

Practical implications

This research emphasizes the importance of information format when communicating about environmental issues and its effect on supporting related policies. While individuals with high

CFC do not depend on a special format of information presentation (quantitative or qualitative) to realize the importance of environmental issues and support environmental policies, communicating the environmental issues in quantitative format can help individuals with low CFC to better understand the importance of the environmental issues and support related environmental policies. This is an important implication for environmental organizations/activists and policy marketers as it confirms that presenting information about environmental issues in quantitative (versus qualitative) can amplify the importance of those issues and result in higher support for environmental policies.

From a practical point of view, since CFC is measured through a scale with 14 items, it is difficult to use this scale as a segmentation criterion for environmental information and policy promotion. However previous studies have shown that CFC can increase with education (Toepoel 2010) which could potentially point out to the importance of communicating environmental issues information in quantitative format specifically to individuals with lower levels of education , for example teenagers and youngsters. Furthermore, it is also suggested in the literature that CFC could decrease with age (Orbell et al. 2004) which suggests elderly people as an important group for receiving quantitative(versus qualitative) information about environmental issues.

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