



Citation for published version:

Walker, BJA, Kurz, T & Russel, D 2018, 'Towards an understanding of when non-climate frames can generate public support for climate change policy', *Environment and Behavior*, vol. 50, no. 7, pp. 781-806.
<https://doi.org/10.1177/0013916517713299>

DOI:

[10.1177/0013916517713299](https://doi.org/10.1177/0013916517713299)

Publication date:

2018

Document Version

Peer reviewed version

[Link to publication](#)

Walker, Benjamin J.A. ; Kurz, Tim ; Russel, Duncan. / Towards an understanding of when non-climate frames can generate public support for climate change policy. In: *Environment and Behavior*. 2018 ; Vol. 50, No. 7. pp. 781-806. (C) The Authors, 2017. Reprinted by permission of SAGE Publications.

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**Towards an understanding of when non-climate frames can generate public support for
climate change policy**

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Towards an understanding of when non-climate frames can generate public support for climate change policy

There is a growing tendency for policy makers to frame climate change action in terms of non-climate benefits, raising important empirical questions regarding the utility of such approaches. Across three studies we explore whether (and when) non-climate frames can lead to greater support for climate policy relative to climate frames. In Study 1 we framed a car-use reduction policy in relation to climate change or public health and showed that non-climate frames can stimulate greater support for climate policy. Study 2 explored frame relevance as a potential boundary condition to the efficacy of non-climate frames. Study 3 found that attempts to frame climate policy in relation to non-climate issues that affect participants personally can fail if that issue is not seen as being sufficiently relevant. We suggest that non-climate frames can be an effective tool in stimulating support for climate policy, however greater consideration of the key mechanisms is required.

Introduction

It is widely acknowledged that countries across the world need to adopt more stringent decarbonization policy to prevent global average temperatures from rising 2 °C above pre-industrial levels (Jordan et al., 2013). Democratic models of governance would suggest that politicians are unlikely to enforce strong climate policy without sufficient public ‘buy in’. However, climate change policies typically present a cost to individuals by penalizing the use of (otherwise) legitimate activities and behaviors that are detrimental to the climate (e.g., through taxes). This creates a challenge in so much as people are often largely supportive of climate policy operating at a broad level (e.g., national greenhouse gas emission targets), but become less supportive once policies become more specific and pose a personal cost (e.g., fuel taxes) (Dietz, Dan, & Shwom, 2007; Leiserowitz, 2006; Tobler, Visschers, & Siegrist, 2012). Consequently, an emergent body of research has identified the need to implement strategies that help to enhance the political feasibility and/or public acceptability of climate policy (e.g., Atkinson et al., 2011; Compston & Bailey, 2012).

Scholars within the field of climate change communication have become increasingly engaged with the concept of framing as a potential tool for increasing support for action on climate change (Nisbet, 2009). For instance, it has been argued that climate change communications should place emphasis on personally relevant impacts, such as projected impacts on relevant icons, rather than focus on psychologically distant impacts of climate change, such as polar bears, or complex scientific information (O’Neill & Hulme, 2009). However, trying to gather public support for climate policy by communicating the risks of climate change is challenging. Overall levels of public belief that human activities contribute towards climate change have remained steady over the past decade in developed countries such as the USA (Saad, 2014) and the UK (Whitmarsh, 2011), and public engagement with climate change has been collectively low (Whitmarsh, Seyfang, & O’Neill, 2011). Crucially,

even when people do express concern about climate change, it is typically perceived as a low priority in comparison to other problems such as crime, air pollution and health care (e.g., Dunlap & Saad, 2001; Leiserowitz, 2005; Upham et al., 2009). In part, this low prioritization is likely to be associated with climate change being a ‘psychologically distant’ issue (Spence, Poortinga, & Pidgeon, 2012), in that individuals commonly perceive the most severe impacts of climate change to be spatially, temporally and socially distant (Leiserowitz, Maibach, Roser-Renouf, & Smith, 2010; Lorenzoni & Pidgeon, 2006; Poortinga, Pidgeon, & Lorenzoni, 2006; Spence et al., 2012). As a result, harnessing public support for climate policy is difficult because individuals often perceive climate change to be uncertain, diffuse and of low relevance to them while seeing its potential remedies as being of high personal cost.

This context speaks to the potential importance of considering the additional, non-climate benefits (alternatively known as ‘co-benefits’) that can result from the implementation of climate policy. These non-climate benefits can range from improved air quality, enhanced employment, and health benefits, through to more specific benefits such as reduced congestion or improved road safety (e.g., see IPCC, 2007). Highlighting these wider benefits may present one potential way of counteracting the lack of personal relevance, ‘uncertainty’ of impacts and distant nature of the benefits of climate policy. Indeed, research has provided evidence that an emphasis on the non-climate (rather than climate-related) benefits of attempts to reduce greenhouse gas emissions can stimulate greater support for decarbonization measures (Bain, Hornsey, Bongiorno, & Jefferies 2012; Maibach, Nisbet, Baldwin, Akerlof, & Diao, 2010; Myers, Nisbet, Maibach, & Leiserowitz, 2012; Walker, Wiersma, & Bailey, 2014). Of particular note, Bain et al., (2012) found that framing action on decarbonization in terms of the non-climate benefits it would deliver (e.g., technological development; a more considerate society) led to greater engagement with climate change

compared to a focus on the risks of climate change. These framing effects were particularly strong for climate change sceptics. A large cross-national study by Bain et al. (2016) also found that belief in certain non-climate benefits had as strong a relationship with motivations to take climate action as belief in climate change. This further supports the notion that communicating non-climate benefits could be effective in motivating action on climate change.

However, other studies have had more mixed results (Aklin & Urpelainen, 2013; Bernauer & McGrath, 2016; Jones, Eiser, & Gamble 2012; Lockwood, 2011). For example, Lockwood (2011) conducted an experiment that tested whether different frames affected participants' support for developing renewable energy (using climate change, economic growth and energy security frames), enforcing residential energy efficiency (using energy security, climate change and comfort frames) and providing financial aid to support action on climate change by developing countries (using security, environmental, historical responsibility and humanitarian frames). His study found that the framing conditions did not have an impact on participants' support for enforcing residential energy efficiency or providing financial aid to developing countries, although energy security frames appeared to generate greater support for renewable energy compared to the climate change and economic growth frames.

This fledgling body of research has therefore produced inconclusive findings regarding whether non-climate frames can be more effective than climate change frames in stimulating support for decarbonization strategies. However, existing studies have employed markedly different methodologies. For example, some studies have provided participants with what we term 'alternate benefit' frames, where a non-climate frame is presented without reference to climate change (e.g., Lockwood, 2011 and Jones et al., 2012), whereas other studies have provided 'co-benefit frames', where non-climate benefits from an action are

communicated alongside climate change mitigation benefits (e.g., Bain et al., 2012; Bernauer & McGrath, 2016; Maibach et al., 2010). Where co-benefit frames are communicated, it is also relevant to consider theory relating to ‘message order effects’ that suggests the order in which information is communicated can influence how people process the issue at hand (e.g., Hogarth & Einhorn, 1992). For example, in a co-benefit frame, it is unclear if the order in which a non-climate frame and climate change frame are presented might influence people’s responses to the communication. These are issues that we explore in detail in Study 1, which investigates whether frames that prioritize public health (as an example of a non-climate frame) can generate greater support for car use reduction policies than might be the case when climate change prioritizing frames are used.

Existing studies assessing the impact of non-climate frames have also not provided an empirically-tested theoretical rationale for why they have, or have not, observed significant framing effects. This makes it difficult to understand what might account for existing findings. To advance understanding in this area, this paper looks at whether frame relevance and perceptions of personal benefit might to be two factors that can underpin the relative effectiveness of climate and non-climate frames. Study 2 tests whether the relative effectiveness of non-climate and climate change frames in stimulating public support for climate policy might depend on how relevant participants perceive the frame in question as being to the targeted issue. Frame relevance was explored in Study 2 because wider framing literature has suggested that the effectiveness of a frame can be affected by how applicable people believe it to be (e.g., Druckman, 2011). Our final study examines whether propensity for non-climate frames to increase support for climate policy might be mediated by their ability to shape public perceptions regarding how personally beneficial the policy will be. This was theorized because research has shown that perceptions of benefit and cost have strong associations with individuals' support for climate policies (e.g., Dietz et al.,

2007). Collectively, these studies seek to advance understanding of when non-climate frames will be more, or less, effective than climate change frames in communicating climate policy.

Study 1: Public Health Frames and Car Use Reduction Policies

There are important gaps, inconsistencies in results and methodological differences within the relevant aforementioned research in this area. As such, our first study was conducted to further test whether non-climate frames can be more effective than climate change frames in stimulating support for climate policy. Specifically, we differentiate between the use of ‘alternate benefit’ frames, which focus upon a non-climate policy rationale and do not mention climate change, and ‘co-benefit frames’, whereby the policy justifications are framed in terms of both climate change and a non-climate benefit. Lockwood (2011) and Jones et al. (2012) both examined differences in support for decarbonization measures among participants provided with either a climate change policy rationale or an ‘alternate benefit’ policy rationale (e.g., energy security) that did not make reference to climate change. Yet, in reality, those promoting a policy might often highlight multiple benefits of a policy simultaneously (Pralle, 2006; Walker, Adger, & Russel, 2015). As an illustrative example of this, the British public are told that the proposed High Speed 2 (HS2) railway initiative linking London to the North of England will ‘transform Britain’s capacity, connectivity, trains, passenger experiences and travel sustainability while driving growth and regeneration’ (High Speed 2 Limited, 2014). Thus, it is also important to analyze the effects of communicating non-climate benefits alongside climate change benefits in what we term a ‘co-benefit’ frame. This latter approach is, to an extent, similar to that used by Bain et al. (2012) who communicated the ‘development’ or ‘personal warmth’ co-benefits of actions that have a primary intention of mitigating climate change (thus mentioning both climate change and non-climate benefits). However, inconsistencies around these methodological elements make it difficult to compare the few existing studies in this area and

thus to advance our understanding regarding the relative efficacy of co-benefit and alternative benefit approaches respectively.

When exploring the effects of co-benefit frames it is also important to consider the potential significance of ‘message order effects’ (Asch, 1946; Hogarth & Einhorn, 1992). It has been long established that the first piece of descriptive information that individuals are exposed to can act as an ‘anchor’ upon which individuals base their interpretations of subsequent information. A classic example of this effect is Asch’s (1946) demonstration that describing a person as ‘intelligent-tall-mean’ led to more favorable impressions than a person described as ‘mean-tall-intelligent’. This is particularly true for communications that are short, simple and evaluated by participants at the end of the message, as is most often the case in framing research (for a review, see Hogarth & Einhorn, 1992). We explore in this study the effects of co-benefits framings that present either a climate change justification followed by a non-climate justification or vice versa. Message order effects research would suggest that if climate change is presented first then individuals should anchor their views of the policy based upon a climate change rationale, with the non-climate benefit being an ancillary, secondary benefit (and vice versa if the alternative benefit is presented first).

Aims and Hypotheses

Study 1 analyzed the effect of different framings of quite stringent policies to reduce car use on levels of policy support for those policies. In particular, it examined levels of policy support when a policy was presented in a way that prioritized either climate change or public health, and when the benefits presented related to either a single frame or a co-benefit frame that included both climate change and public health. Thus, our design included a climate change (CC) frame, a public health frame (PH), a combined climate change and public health frame (CCPH) and a combined public health and climate change frame (PHCC). The PHCC frame is considered here as prioritizing public health (in addition to the

PH frame). This is because the PHCC frame draws participants' attention to an 'anchor' of public health prior to mentioning climate change. Conversely, the CC and CCPH frames are considered here as prioritizing climate change. Further details on the differences between the frames are provided in the methods section below. A public health frame was used because a separate pilot study ($n=57$) undertaken on a different set of similar participants found that, compared to seven other broad policy areas, individuals identified public health to be the most important priority that they felt should be addressed by government policy ($p < .01$).

Two hypotheses were examined within Study 1. First, it was anticipated that the frames that prioritize public health (PH, PHCC) would stimulate greater levels of support for policies to reduce car use compared to climate change prioritizing frames (CC, CCPH). This is because, as discussed above, climate change is often seen to be psychologically distant, uncertain and of low priority, whereas public health issues might be perceived to be more 'certain' and of higher priority by many individuals (Leiserowitz, 2005). Thus, frames that emphasize a public health policy rationale may resonate with more members of the public than climate change frames and thus generate greater public support. Second, we expected to see interactions between the framing conditions and individuals' level of climate skepticism such that those expressing views more skeptical of climate change show a particularly strong tendency to be more supportive of policy framed in terms of public health. This is because frames that prioritize public health are more likely to be aligned with their pre-existing priorities than frames that are perceived to emphasize climate change.

Method

Research Design. A 2 x 2 between-participants design was used with number of frames (single frame vs. co-benefit frame) and frame prioritization (climate change vs. public health) as the independent variables. To implement this design participants were randomly assigned

to one of four framing conditions, which presented identical information about policies that sought to deliver more stringent action on reducing car use using either a PH frame, a CC frame, a CCPH frame or a PHCC frame (see supplementary online Appendix A for framing text). Participants' climate change beliefs were also measured as a continuous variable. The dependent variable was participants' support for the car use reduction policies.

Participants. Participants were 240 students at the University of Exeter, 155 of whom were female. Participants were approached on campus at the university to complete a questionnaire that was administered face-to-face in October 2012. Participants were provided with a free chocolate bar and a chance to win Amazon gift vouchers as compensation for their time.

Materials and Procedure. All participants were presented with what appeared to be a 'screen grab' of an online news article, which they were led to believe was authentic, but in fact was created by the authors. The article provided information on a package of 'stringent' car use reduction policies (such as congestion charging and increasing the price of fuel) that could potentially be implemented in the United Kingdom, presented using one of the four framing conditions in our design. The only variations in text were differences in the rationale(s) for why the government was considering the policies in question. For instance, the first line of the CC frame started with the statement 'given the negative impact of car use on climate change' whilst the PH frame stated 'given the negative impact of car use on public health' and highlighted public health issues such as air pollution within the article. The CCPH and PHCC frames were identical in terms of their wording except that climate change was consistently mentioned before public health in the CCPH frame, and vice versa in the PHCC frame. For example, the title of CCPH framed article was 'Reducing Car Use: An Important Step for Climate Change and Public Health' whilst the PHCC framed article had a heading of 'Reducing Car Use: An Important Step for Public Health and Climate Change'.

A second section of the survey sought participants' views on the policies to reduce car use that were presented within the article (see supplementary online Appendix B for details of all items in the survey). A multi-item measure ($\alpha = .87$) that consisted of four questions/statements was used to measure participants' level of policy support on a seven-point scale (e.g., 'how strongly would you support or oppose these policies to reduce car use?'). Attitudes toward climate change were measured using a subsidiary set of six items from Whitmarsh's (2011) Climate Change Skepticism scale. All items were measured on a 7-point scale from 'strongly disagree' to 'strongly agree'.

Results

In order to test our hypotheses, we first conducted a multiple regression that included, as the first step, frame priority and frame number as dichotomous predictors, climate skepticism as a continuous predictor and policy support as the outcome variable (See Table 1). This revealed that, overall, frames prioritizing public health were associated with higher levels of policy support than frames prioritizing climate change, $\beta = .14$, $t(236) = 2.21$, $p = .028$. As anticipated, the number of frames participants received did not significantly affect policy support, $\beta = -.01$, $t(236) = -.09$, $p = .93$. Participants' greater climate skepticism was associated with significantly lower levels of policy support, $\beta = -.21$, $t(236) = 32.27$, $p < .01$.

As a second step we also entered interaction terms into the model to test for interactions between frame priority and frame number and between frame priority and climate skepticism (the latter was to test whether public health prioritizing frames were particularly effective for climate skeptics). There was not a significant interaction between frame prioritization and the number of frames, $\beta = -.23$, $t(235) = 1.10$, $p = .27$, or between frame prioritization and climate skepticism, $\beta = .14$, $t(235) = .71$, $p = .48$.

Discussion

The results of Study 1 indicate that non-climate frames of climate policy may enhance levels of public support, compared to the use of climate change frames. Participants exposed to public health prioritizing frames had significantly stronger levels of policy support compared to participants exposed to the climate change prioritizing frames. It was particularly notable that this was seen in both the single and multi-frame conditions. Thus, we observed distinct differences in levels of policy support under the PHCC and CCPH framing conditions even though they contained exactly the same wording presented in a different order. A number of models have been put forward to explain message order effects based upon a range of factors including message length, levels of elaboration, mode of processing and message complexity (e.g., Haugtvedt & Wegener, 1994; Hogarth & Einhorn, 1992). Given the message used in this study was simple, short, repeated and evaluated at the end (as opposed to asking participants to do step-by-step evaluations), message order effects theory would indicate that the PHCC frame effects are likely to be a result of individuals developing their views around the public health ‘anchor’ of the PHCC frame (Hogarth & Einhorn, 1992). What Study 1 clearly shows is that simply ‘bundling together’ different benefits when communicating a policy without considering the type, number or order of benefit emphasis may be a risky strategy for gaining public support for the policy in question. This study had inconclusive findings regarding the effect that non-climate frames can have upon support for climate policy among climate change septics and believers.

The results of Study 1 suggesting that non-climate frames can stimulate policy support complement the findings of Bain et al. (2012) and Maibach et al. (2010). Yet, studies by Aklin and Urpelainen (2013), Jones et al. (2012), Bernauer and McGrath (2016) and Lockwood (2011) have had more mixed and inconclusive results. This raises an obvious question of when non-climate frames might be most likely to lead to greater levels of support for climate policy compared to climate change frames. This is a question previously

unexplored within existing research and one that guides the remaining studies in this paper. Perhaps without exception, any given policy that reduces greenhouse gas emissions could be communicated using a diverse array of non-climate frames. For example, this study used public health as a non-climate frame because it was shown to be an important policy priority in a pilot study – different types of non-climate frames that could be used to communicate policies to reduce car use may potentially yield different results. Thus, understanding the underlying reasons behind the effectiveness of particular frames to determine when a given non-climate frame is likely to be effective is critical if framing research is to provide practically useful information.

Study 2

Although existing research has provided some insight into whether non-climate frames can enhance support for climate policy, insight into when this is (and is not) likely to be the case is still lacking. Therefore, our second study investigated whether ‘frame relevance’ might be one determinant of the relative effectiveness of non-climate and climate change frames in stimulating support for climate policy. This importance of ensuring that participants perceive a frame to be applicable has been documented in wider framing research (e.g., Chong & Druckman, 2007; Druckman, 2011; Scheufele & Tewksbury, 2007) although, as far as we aware, has not been tested in the area of framing action on climate change. We measured participants’ perceptions of frame relevance by asking them how beneficial they perceive a policy will be for the framed issue. For instance, a rationale for a renewable energy policy framed around energy security might be less effective than a climate change frame if individuals believe that the policy will do more for tackling climate change than for enhancing energy security. Indeed, it seems plausible that frame relevance might explain findings from some existing research. For example, in Lockwood’s (2011) study it could be the case that energy security frames were the most effective frame for harnessing support for

renewable energy because these were perceived to have higher levels of ‘frame relevance’ relative to climate change and economic growth frames. Thus, Study 2 tested our hypothesis that the relative effectiveness of non-climate and climate change framings in harnessing policy support can be influenced by their level of ‘frame relevance’ such that policy support would only be increased if the frame in question was perceived to be relevant to the issue being targeted.

Method

Research Design. Study 2 employed a 2 x 2 mixed-model design, which consisted of frame type (climate change vs. public health) and policy (reducing the national speed limit vs. increasing the price of fuel)ⁱ. Frame type was manipulated between participants, who were randomly allocated to one of the two framing conditions. Policy was manipulated within-participants, with all participants receiving details of both of the two policies. Relative to their communicated framing condition, one policy was designed to have ‘high frame relevance’ while one policy was designed to have ‘low frame relevance’. This had been established in a separate pilot study ($n=52$) undertaken on a different set of demographically similar participants that had shown people perceive a policy to reduce the national speed limit to be of more benefit for enhancing public health through reducing traffic accidents ($M = 4.37$, $SE = .22$) than for reducing carbon emissions ($M = 3.58$, $SE = .24$), $t(51) = 2.91$, $p = .005$ (a seven-point scale was used). Conversely, a policy to increase the price of fuel was perceived by those same participants to have greater benefit for reducing carbon emissions ($M = 4.44$, $SE = .24$) than for improving public health through tackling obesity ($M = 3.33$, $SE = .23$), $t(51) = 5.82$, $p < .001$. Manipulation checks were also incorporated within Study 2 to check that these same perceptions existed within our main sample. Both policies could plausibly contribute to climate change mitigation as they can both result in lower fuel usage

(and thus greenhouse gas emissions), although increasing the price of fuel is likely to be a more effectual mechanism to achieve this (e.g., see Chapman 2007).

A mixed model design was used as manipulating policy within participants allowed us to generate more statistical power from fewer participants. Importantly, presenting two different policies to each participant did not undermine the ‘face validity’ of the study, nor did it make the hypotheses obvious to the participants. We hypothesized that that there would be a significant interaction between frame and policy upon policy support. We expected participants exposed to a public health justification to have greater policy support for reducing the national speed limit (where it has higher frame relevance) than for a proposed policy to increase the price of fuel (where it has lower frame relevance), relative to those who received a climate change frame.

Participants. Participants were 59 students at the University of Exeter who completed an online survey, 45 of whom were female. Twenty-nine participants received a public health framing condition while 30 received the climate change framing condition. Participants were recruited in April 2013 through a student mailing list and were offered the chance to enter a prize draw for Amazon gift vouchers as an incentive.

Materials and procedure. Participants first read a body of text that appeared to be an extract from a news article (but was, in reality, actually fictitious). This text first described how a package of potential policies had been put together by the UK government to address either ‘climate change’ or ‘public health’ (depending on the framing condition participants received). Participants were then presented with details of potential plans to: i) reduce the national speed limit; and ii) increase the price of fuel. The policies were both communicated in line with participants’ framing conditions (see supplementary online Appendices C and D for framing text and details of survey items, respectively). Participants answered three questions that measured support on a seven-point scale for each of the two policies: reducing

the national speed limit ($\alpha = .79$) and increasing the price of fuel ($\alpha = .79$). Items were also included to check if frame relevance was sufficiently manipulated in the survey design. These measured how beneficial participants believed that reducing the national speed limit (three items, $\alpha = .91$) and increasing the price of fuel (three items, $\alpha = .90$) would be for the issue that their frame had presented as the justification for the proposed policies (e.g., ‘I doubt that this policy will deliver substantial benefits for the issue it is trying to address’).

Results

Manipulation check. We first analyzed our manipulation check measure by conducting ANOVA analyses separately for each policy to see whether the framing conditions had an effect upon participants’ perceptions of how relevant the frame used was to the policy in question. First, an ANOVA was conducted with the framing conditions as independent variables and perceived frame relevance as the dependent variable. The results showed that the framing conditions did indeed have an impact upon individuals’ perceptions of how relevant their frame was for a policy to reduce the national speed limit, $F(1,57) = 5.02, p = .03, \eta^2 = .08$. Those subjected to the public health framing condition ($M = 4.54, S.E. = .28$) perceived the speed limit policy to be more beneficial for their framed issue compared to those exposed to the climate change framing condition ($M = 3.77, S.E. = .27$). For the fuel price increase policy, those exposed to the climate change framing condition perceived the policy to be of greater benefit for their framed issue ($M = 4.08, S.E. = .25$) compared to those exposed to the public health framing condition ($M = 3.10, S.E. = .25$), $F(1,57) = 7.50, p < .01, \eta^2 = .12$. These results reflect the findings of a pilot study and demonstrate that the study did successfully manipulate frame relevance.

Primary analyses. A mixed-model ANOVA was conducted to analyze the effects of frame and proposed policy on policy support. Crucially, we tested for a significant interaction

between framing and policy to allow us to directly examine our hypothesis that the effectiveness of a public health or climate change frame is dependent upon how relevant each frame is seen as being for the policy it is being used to engender support for.

In line with our expectation, we observed a significant interaction between frame type and policy, $F(1,57)=4.61, p = .036, \eta^2 = .08$ (Figure 1). Separate pairwise comparisons were also undertaken to examine differences in main effects of the frames upon support for each of the two policies. In relation to the policy to reduce the national speed limit, respondents exposed to the (higher relevance) public health frame did not have significantly different levels of support ($M = 4.51, S.E. = .27$) compared to those exposed to the (lower relevance) climate change framing condition ($M = 3.81, S.E. = .27$), $F(1,57)=3.30, p = .07, \eta^2 = .06$. For the policy to increase the price of fuel, respondents within the (higher relevance) climate change framing condition ($M = 3.58, S.E. = .27$) did not have significantly different levels of policy support compared to those subjected to the (lower relevance) public health framing condition ($M = 3.26, S.E. = .27$), $F(1,57)=.68, p = .41, \eta^2 = .012$.

Discussion

The results of Study 2 facilitate a progression in understanding of when non-climate frames can be more effective than climate change frames in enhancing support for climate policy. Our results show that the relative effectiveness of public health and climate change framings in harnessing public support for potential climate policies depended on how relevant the policy-frame match was perceived to be (as shown by the significant interaction between frame types and policy). It would appear therefore that an important boundary condition to the utility of using alternative benefit frames to frame climate-friendly policy is the extent to which members of the public will perceive that the policy in question will indeed bring about benefits for the non-climate issue around which it is framed. Where there might be potential doubts in this regard, it would seem that policy makers may do better to simply focus on the

climate benefits. Having established in Study 2 the importance of frame relevance, we sought in our final study to explore another key variable that one might expect to influence the impact of different framings of climate policy on support for that policy, namely, the extent to which the frame positioned the policy as in the participants' own personal interest.

Study 3

Past research has shown that individuals are more likely to support a policy if they perceive it to be of low cost and/or of high benefit to themselves (Dietz et al., 2007; Leiserowitz, 2006; O'Connor, Bord, Yarnal, & Wiefek, 2002). Non-climate frames appear better placed than climate change frames to influence perceptions of personal benefit due to their ability to place emphasis on issues that might be perceived as shorter term and more personally relevant. For instance, issues such as tackling rising energy prices, reducing congestion or promoting local economic growth may be more visible and personally relevant to many people's everyday lives than are the predicted impacts of global climate change.

Study 3 tests the effects of using 'tackling rising energy prices' as a non-climate frame. This frame was deemed a potentially suitable frame for changing perceptions of personal benefit given it is an issue that is very visible and directly affects many individuals. For instance, a large-scale survey of UK citizens found almost 60% of people to be concerned about rising bills (DECC, 2013). Some research has provided insight into whether non-climate frames that focus on personal benefit can influence direct individual behavior and has not found any evidence to support this (e.g., Bolderdijk et al., 2013; Spence et al., 2014). However, as far as the authors are aware, no studies have explored the specific potential for changing perceptions of personal benefit to mediate changes in support for climate policy under the use of non-climate frames. This is particularly important in the context of this paper, given the aforementioned evidence that has continually demonstrated strong associations between individuals' perceptions of personal cost/benefit and their support for

climate policy. Study 3 tested a hypothesis that a tackling rising energy prices frame would generate greater support for climate policy than a climate frame because it would enhance perceptions of how personally beneficial the policy would be to the person evaluating the policy.

Method

Research Design. Study 3 employed a between-subjects design whereby participants were exposed to one of two framing conditions. All participants were exposed to information regarding a proposed policy to double the amount of renewable energy used within the UK. Participants were told that the government's justification for the policy was to either tackle climate change or tackle rising energy prices (see supplementary online Appendix E for framing text). Our dependent variable was support for the policy to double renewable energy. Perceptions of personal benefit and perceptions of frame relevance were also measured to examine if these mediated framing effects.

Participants. This study used a community sample, building upon the two prior studies that had relied on student samples. Participants ($n=80$) were recruited to complete a pencil-and-paper survey in Wimbledon Park, London (UK) in July 2013 through a face-to-face recruitment method using a convenience sampling approach. The sample comprised 48 females and 32 males. There was a range of ages, with 29 participants aged 18-29; 25 participants were 30-49; 36 participants were aged 50-69; 1 participant was aged over 70 and 1 participant preferred not to disclose this information. Participants were offered the chance to win Amazon vouchers by trying to pick a 'prize out of a hat' in order to compensate them for their time.

Materials and procedure. The survey itself comprised three sections. Participants were presented with information on the renewable energy policy (which included increased government investment to support wind farms and solar power) in the form of a 'screen grab'

of an ostensibly real, but actually fictitious, online news article. The information provided in this article did not vary substantially across the framing conditions, with only subtle changes to the wording being made to frame the article in terms of tackling climate change or tackling rising energy prices. For example, the first sentence stated ‘the government have today announced ambitious proposals to more than double the number of renewable energy projects within the UK in order to tackle [rising energy prices/climate change]’.

A second section then gauged individuals’ perceptions of the policy (see supplementary online Appendix F for details of all items in the survey). Three items were used to measure participants’ support for the policy ($\alpha = .94$) on a seven-point scale and three items were used to measure how personally beneficial participants believed the policy would be ($\alpha = .89$), which was included as a potential mediator (e.g., ‘how beneficial do you think this policy will be for you’). Given the demonstrated importance of perceived frame relevance in Study 2, one question also asked participants about how beneficial they believed the policy would be for their framed issue. Perceptions of personal benefit and perceived frame relevance were significantly correlated, $r(79) = .38, p < .01$.

The macro ‘PROCESS’ (Hayes, 2012, 2013) was used to analyze the results of Study 3. PROCESS enables the simultaneous analysis of multiple mediators and reduces the number of inferential tests undertaken. PROCESS was used to test if perceived personal benefit and/or perceived frame relevance significantly mediated any differences in participants’ support for doubling the number of renewable projects under the climate change (coded 0) or energy prices (coded 1) framing conditions.

Results

The results of the PROCESS mediational model (Figure 2) indicated that participants who received the climate change frame did not have significantly different levels of support for the policy compared to those who were exposed to the rising energy prices frame (total

effect = $-.42$, $p = .13$). It should be noted that a significant main effect is not necessary when conducting indirect mediation analysis; instead it is widely considered that relationships with the mediation variables are most important (e.g., see Preacher & Hayes, 2008, Rucker et al., 2011). Indeed, the effect of the framing conditions diminished when the two potential mediators were simultaneously included within the model (direct effect of framing conditions = $-.20$, $p = .43$) suggesting the possibility of significant mediation.

The model found that perceived frame relevance significantly mediated the effect of increased policy support under the climate change frame compared to the tackling rising energy prices frame (95% bias-corrected bootstrap confidence intervals of $-.59$ to $-.04$). Analysis of the causal pathways (Figure 2) shows that the climate change frame was associated with significantly greater levels of perceived frame relevance than the tackling rising energy prices frame. Furthermore, the model found participants' levels of perceived frame relevance to have strong positive associations with their levels of policy support.

Perceptions of personal benefit (bias-corrected bootstrap confidence intervals of $-.21$ to $.19$) did not mediate at a 95% confidence level. Analysis of the causal pathways (Figure 2) shows that the model indicates that perceived personal benefit had an important influence on policy support, but it was not influenced by the framing conditions that participants were exposed to.

Discussion

We had reasoned that non-climate frames of climate policy may offer greater opportunity to change individual perceptions of how personally beneficial the outcomes of a climate policy will be, compared to the use of climate change frames. However, the 'tackling energy prices' frame that was used to communicate the policy did not affect participants' perceptions of how personally beneficial the policy would be. Thus it is not possible to draw firm conclusions about the potential for non-climate frames to increase support for climate

policy by changing public perceptions of personal benefit. However, interestingly, the results of Study 3 indicated that attempts to frame climate policy in relation to issues that affect participants personally can have an adverse effect if that issue is not seen as being suitably relevant to the policy. Our analysis showed that the climate change frame was associated with higher support than the energy prices frame (a frame we anticipated would be seen as being personally beneficial) and this effect was shown to be mediated by perceptions of frame relevance.

The results of Study 3 reinforce emerging findings from recent research that suggests a need to exercise caution and restraint in trying to stimulate pro-environmental behavior by focusing on personal gain (Bolderdijk, Steg, Geller, Lehman, & Postmes, 2013; Corner, 2013; Evans et al., 2013; Spence, Leygue, Bedwell, & O'Malley, 2014). For instance, research by Evans et al. (2013) showed that trying to induce pro-environmental behavior through motives of self-interest is less likely to lead to behavioral spill-over (whereby undertaking one pro-environmental behavior becomes a catalyst for changes in other pro-environmental behaviors) compared to action that is driven by self-transcendent motives. The current research adds to this body of research by highlighting potential counter-intentional effects that can occur when trying to stimulate public support for climate policy by attempting to focus on non-climate, personally beneficial policy outcomes. On the basis of these findings one might suggest to policy makers that they avoid assuming that members of the public will automatically show more support for a climate policy if they are told there is 'something in it for them', especially if there is any ambiguity regarding whether such claims of personal benefit will be believed. However, as Study 3 did not influence perceptions of personal benefit, it remains unclear as to whether non-climate frames can increase support for climate policy by changing perceptions of personal benefit in a situation where the frames are seen as more relevant and/or might be more able to influence perceptions of personal benefit.

General discussion

Through the three studies reported above we sought to enhance our understanding of when non-climate frames can enhance public support for climate policy. First, we demonstrated that non-climate frames offer some potential to increase support for decarbonization measures (cf., Bernauer & McGrath, 2016). Using a novel distinction between co-benefit and alternate benefit frames, we showed in Study 1 that frames prioritizing public health led to significantly higher support for policies to reduce car use in comparison to climate change prioritizing frames thus supporting those studies suggesting the importance of framing on the public's engagement with climate change (e.g., Bain, Hornsey, Bongiorno, & Jefferies, 2012; Maibach, Nisbet, Baldwin, Akerlof, & Diao, 2010; Myers, Nisbet, Maibach, & Leiserowitz, 2012; Walker, Wiersma, & Bailey, 2014) over the existing research that suggests a more mixed outcome (Aklin & Urpelainen, 2013; Bernauer & McGrath, 2016; Jones, Eiser, & Gamble, 2012; Lockwood, 2011). However, our research further advances understandings in the current literature on climate change framing by demonstrating that non-climate frames offer no simple panacea - it would be premature to assume that these frames will always lead to overall levels of increased public support for climate policy because their effectiveness is likely to depend on a number of factors, including hitherto unaccounted for message ordering effects that our research suggests can frame policy co-benefits in a manner that impacts upon policy support. Moreover, our research sought to build on current understandings of climate framing through exploring when, and why, non-climate frames might be more (or less) effective than climate change frames. In combination, Studies 2 and 3 suggest that perceived frame relevance - the level of impact that individuals believe a policy will have on the issue used as a frame - can determine the relative effectiveness of climate and non-climate frames in generating support for climate policy. Thus, prior to communicating a policy and its associated justification(s), policy

makers should be confident that members of the public will believe that the policy will have a significant impact upon the communicated policy rationale. While the credibility of a frame is something recognized in the general framing literature (e.g., Druckman, 2011), this aspect has yet to be fully explored in the aforementioned climate change literature.

This research also tested whether non-climate frames can generate support for climate policy by changing public perceptions of how personally beneficial the outcomes of this policy will be. Indeed, emphasizing the financial benefit (e.g., energy saving costs) of decarbonization action is an approach that is commonly used by policy makers. As noted above, while some research has provided evidence suggesting that non-climate frames that focus on personal benefit have little effect on individual behavior (e.g., Bolderdijk et al., 2013; Spence et al., 2014), this research sought to extend this strand of research by exploring the potential for changing perceptions of personal benefit to mediate changes in support for climate policy under the use of non-climate frames. However, we did not find evidence to suggest that this is necessarily an effective strategy for framing policy. In fact, trying to portray to individuals that a policy is personally beneficial for them can ‘backfire’ if individuals do not believe that the policy will deliver these benefits. In Study 3 we showed that participants who were provided with a climate change rationale for a potential increase in renewable energy technologies had higher levels of support than participants that were informed that the rationale for the policy was to tackle rising energy prices, an effect mediated by perceived frame relevance. It should be noted that providing individuals with a tackling rising energy prices frame did not significantly influence participants’ perceptions of how personally beneficial a policy would be compared to a climate change frame. As individuals appeared skeptical regarding the extent that the policy would reduce energy prices (see the above discussion of frame credibility) this may, in turn, have resulted in them doubting how personally beneficial the policy was. Thus, given the gap in the literature and

these findings, further exploration of whether ‘relevant’ non-climate frames can enhance support for climate policies by changing public perceptions of how personally beneficial a policy is warranted.

The current findings suggest many areas that could be fruitfully examined in future research. We hope to have demonstrated that there is now a need for research to progress beyond looking at whether non-climate frames can be effective in stimulating support for decarbonization action, to begin to consider when and why these frames might be effective. We have demonstrated here the importance of frame relevance, however there are potentially many other variables that might moderate or mediate the efficacy of non-climate frames. As just one example, non-climate frames might be able to increase support for decarbonization strategies through their greater ability to construct the supporting of the policy as socially normative. There is a growing body of literature in the area of pro-environmental behavior demonstrating that people are more likely to engage in individual pro-environmental behaviors if they believe that many others are also doing so (e.g., Goldstein, Cialdini, & Griskevicius, 2008; Lindenberg & Steg, 2007; Nolan, et al., 2008). However less explored in this literature is whether perceptions of the normativity of support for a policy might be influenced by the issues around which a policy is framed. Miller (1999) and Ratner and Miller (2001) have argued that in individualistic societies such as the USA, there is a ‘norm of self interest’ such that individuals expect others to act in line with their own interests and may even perceive selfless acts negatively or as a norm violation. In light of this, many people may be more likely to believe that other members of their community and social group support a decarbonization policy due to non-climate benefits (e.g., energy security, reduced energy prices). By comparison, under a climate change frame people might perceive social mobilization around an environmental agenda to be limited only to pockets of populations and ‘certain types of people’. Thus, given existing studies have mixed findings

regarding the effectiveness of framing climate policy, we believe that this study demonstrates the need for future studies to place greater attention on the social psychological mechanisms by which frames may influence policy support.

It is important to acknowledge some limitations to the studies and findings contained within this paper. First, the studies in the paper only used a limited range of potential non-climate framing areas (public health and energy prices). The effectiveness of non-climate frames might be dependent on a range of factors including how widely valued or prioritized the framing area is and, as such, exploration of the effectiveness of different non-climate frames would help to further enhance understanding of the reasons behind the relative effectiveness of non-climate and climate change frames. Additionally, it is necessary to highlight that the studies contained within this paper do not have particularly large sample sizes. As a result, some of the non-significant effects (such as the main/direct effects of frame on policy support in Study 2 and Study 3) should be regarded as inconclusive as the studies may not have been sufficiently powered to detect these. Finally, it is necessary to stress that the potential of framing to stimulate support for climate policy should not be overstated – multiple studies have found framing to have limited or no effect, particularly compared to other influences such as their views on climate change (Bernauer & McGrath, 2016), and it is unclear how long any framing effects will last.

Conclusions

In this paper we set out to advance understanding of whether, and when, framing climate policy in terms of its non-climate benefits can lead to greater levels of public support, compared to the use of climate change frames. First, we demonstrated that framing climate policy around its non-climate benefits can significantly enhance levels of public policy support. However, our findings also demonstrate the danger in assuming that non-climate

frames will always lead to greater support for climate policy compared to the use of climate change frames. Indeed, Studies 2 and 3 showed that frame relevance is one key factor that can define the relative effectiveness of non-climate and climate change frames in engendering support for policy. These findings mark an important step in the burgeoning body of research examining the effects of using non-climate frames by initiating an understanding of factors that are likely to determine the relative effectiveness of climate and non-climate frames. These findings herald a call for researchers to progress beyond looking at whether non-climate frames can be effective in stimulating support for decarbonization action, to instead examine in more detail the questions of when and why these frames will (and will not) be effective.

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Endnotes

ⁱ This pilot study tested the perceived relevance of a range of potential framing areas for a number of different policies. Public health was chosen as the non-climate framing area for Study 2 because the pilot study found that this was the framing area where the greatest differences in perceived relevance for the different policies were.

Table 1

Summary of multiple regression analysis for variables predicting policy support in Study 1 ($n = 240$)

Variable	Model 1				Model 2			
	<i>B</i>	<i>SE B</i>	β	<i>P</i>	<i>B</i>	<i>SE B</i>	β	<i>P</i>
Prioritization of frame (Climate Change 0; Public Health 1,)	.38	.17	.14	.028	.19	.24	.07	.44
Number of frames (Single 0, combined 1)	-.01	.17	-.01	.93	.55	.54	.21	.31
Climate skepticism	-.255	.08	-.21	.001	-.42	.25	-.34	.088
Prioritization of frames*climate skepticism					.11	.16	.14	.48
Prioritization of frames*no. of frames					-.38	.34	-.23	.27

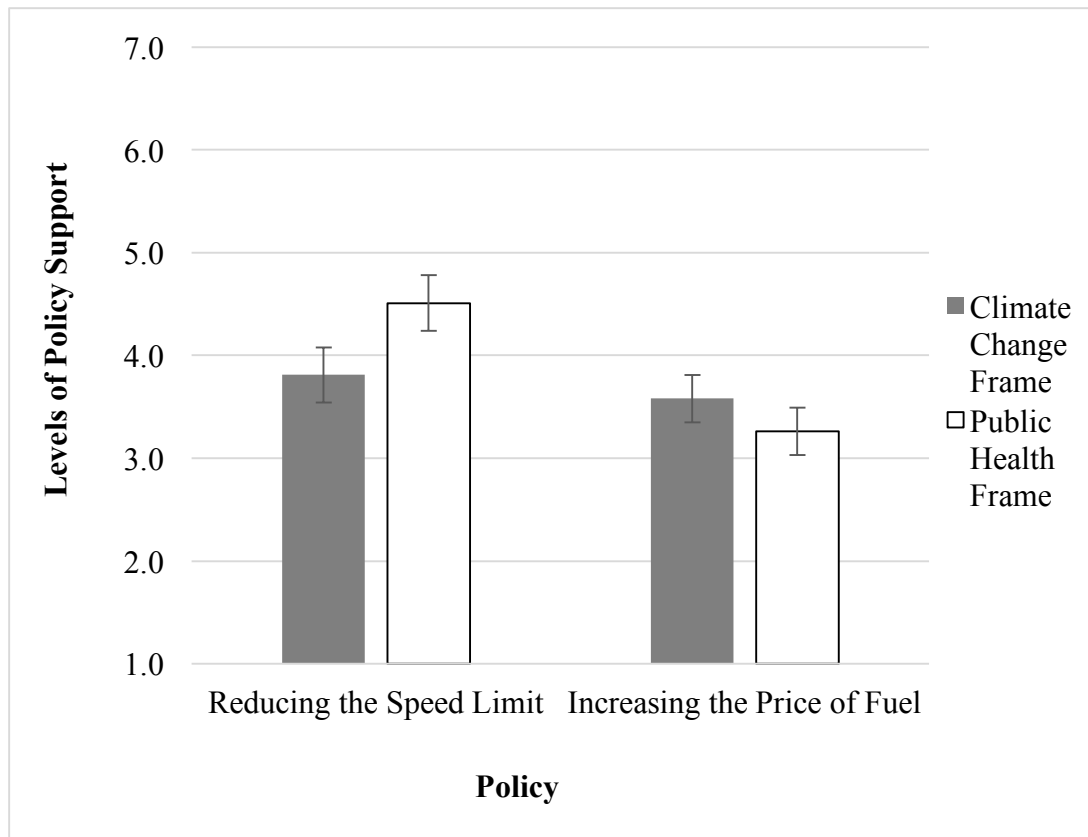


Figure 1. Estimated marginal means (with standard error) of support for policies ranging from 1 (Strongly Oppose) to 7 (Strongly Support) under the two framing conditions in Study 2. This shows the results of a mixed-model design whereby participants who received either a public health or climate change frame (between subjects variable) stated their level of support for both reducing the speed limit and increasing the price of fuel (within subjects variable).

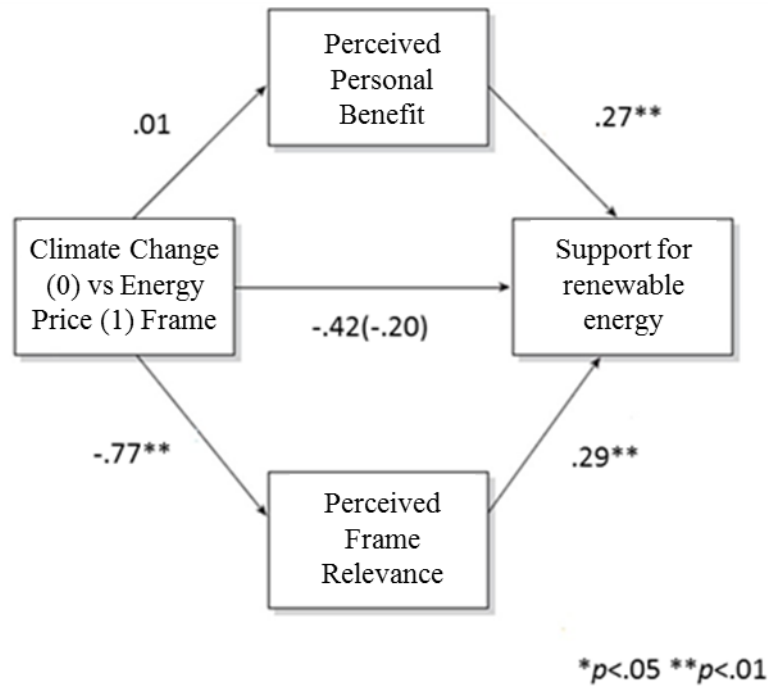


Figure 2. An overview of the results of Study 3. Results of the PROCESS mediational analysis that compares participant support for the policy under the climate change (Coded 0) and energy price (Coded 1) framing conditions. The reported path values are the unstandardized regression coefficient. The total effect of the framing condition upon support for the renewable energy policies before the inclusion of potential mediators lies outside the parentheses. The direct effect of the framing condition after the inclusion of the potential mediators lies within the parentheses.