# Up Close and Personal

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## Can Climate Change Policy Framing Increase Citizen Support?

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*Abstract*

Support for climate change policies is crucial in the quest of limiting climate change. However, the success of the traditional method, highlighting the environmental benefits of policies, has stalled (Bain et al., 2015). The traditional method is especially ineffective in gathering policy support for people who do not (fully) believe in the problem of climate change (climate change critics).

In a recent study, Bain et al. (2015) find a new method to engage people in environmentally friendly behaviour. Bain et al. (2015) state that this method is effective for both climate change critics and non-critics. In this method, policy information gets framed in terms of personal benefits called co-benefits. Examples are: saving money by using green energy and health benefits due to cleaner air. Informing people through the use of co-benefits is called a gain frame.

If a gain frame is indeed effective for both climate change critics and non-critics, the use of a gain frame could potentially lead to a substantial increase in climate change policy support. Up until now, this has not been tested. Furthermore, several studies suggest that negative information has a stronger psychological effect than positive information (Baumeister et al., 2001). Therefore, the use of a loss frame, which highlights personal costs of climate change, may have a stronger effect on policy support. However, Bain et al. (2015) have not taken this into account.

In this study, I test and extend the theory of Bain et al. (2015) in four ways: (1) I test the external validity by examining the effect of a gain frame on climate change non-critics, (2) I add a loss frame, (3) I look at the possible different effects of health and financial co-benefits and co-costs, and (4) I connect the 'values-belief-norms' (VBN) theory with the theory of framing by looking at the effect of gain and loss frames on people with different levels of egoistic and altruistic values.

I find that the use of a gain and loss frame is not successful in gathering climate change policy support. The gain and loss frames decrease policy support for people who believe in climate change. This finding can be explained by the theory of framing: a frame needs to correspond with the belief system of the audience (Dietz et al., 2007). I find that if a frame focuses on personal costs and benefits, while a person is concerned about environmental costs and benefits, the frame has a negative effect and decreases policy support. Furthermore, I find no significant difference between a health and a financial topic and no significant relationship between egoistic and altruistic values in relation to different frames. These findings highlight that the use of frames is not the ultimate solution for the problem of the stagnated support for climate change policies.

**\* Points for practitioners -** This article looks at the possibility to use gain and loss frames to increase policy support. Gain and loss frames focus on personal benefits and costs of a policy. Despite the recent finding that gain framing can motivate both climate change critics and non-critics to engage in environmentally friendly behaviour, this study finds that framing does not increase policy support for non-critics. A frame can decrease support if the frame does not match one's personal beliefs. Further research is necessary to determine the effect of frames on climate change critics. However, even if frames are successful in gathering support for climate change critics, this study shows that the use of a frame may be counterproductive: the possible increase in support of climate change critics may be compensated by the decrease in support of non-critics. Therefore, I do not recommend switching to a gain or loss frame to gather more climate change policy support.

# 1. Introduction

Climate change: scientists see it as one of the biggest problems of today's society and yet, gathering citizen's support for climate change policies does not come easy (Pew Research Centre, 2014). Policy support is crucial for the success of climate change policies. However, the problem of climate change is complex and for some citizens, the problem of climate change may seem unreal, impossible to solve, a problem for later, or may simply not seem important at all. Many scholars have conducted studies to find ways to engage the public in environment friendly behaviour and to increase support for climate change policies (Dietz et al., 2007 and Uyeki and Holland, 2000).

The main problem in gathering support for climate change policies is that the traditional method, highlighting environmental benefits, is ineffective for people who do not (fully) believe in the problem of climate change (Pew Research Centre, 2014). I refer to these people as *climate change critics*. In this study, a 'climate change critic' is an overarching term for people who are (partly) unconvinced that climate change is happening, that it is a problem, or that humans are responsible for the changes in climate.

A recent study by Bain et al. (2015) has found a new and effective way to motivate all citizens, both climate change critics and non-critics to act against climate change: highlighting co-benefits. Co-benefits are personal and community benefits that result from mitigating behaviour such as using green energy instead of fossil fuel. Examples of co-benefits are technical developments, job creation, cheaper energy, continuous energy source, and a healthier lifestyle (cycling, walking, etc.) (Bain et al, 2015: 1).

In short, the theory of Bain et al. (2015) is that highlighting co-benefits of fighting against climate change increases people's motivation to act against climate change. If co-benefits indeed have a positive effect on both climate change critics and non-critics, this could have large consequences for communication methods regarding climate change. For example, the government could use co-benefits as the new dominant method to inform people on climate change polices. Since the traditional method fails to gather policy support for climate change critics and Bain et al. (2015) claim that co-benefits are an effective method for both critics and non-critics, the use of co-benefits to communicate on climate change policies could solve the problem of the stagnation in support for climate change policies.

The effect of co-benefits on support for climate change policies has not been tested yet. In this study, I test the applicability of the theory of Bain et al. (2015) and explore new ways of gathering climate change policy support.

## 1.1 The problem with the current method of gathering support – The environmental frame.

Since the industrial revolution, human activities, such as agriculture and the burning of fossil fuel, have increased the concentration of greenhouse gasses in the atmosphere. This causes global warming (Pew Research Centre, 2014). After years of research and debate, the need to limit global warming is now widely acknowledged by scientists, governments, and many citizens (Urwin and Jordan, 2008: 180).

Governments can limit global warming by implementing climate change policies. An example of a climate change policy is subsidizing green energy. At the climate conference in Paris in 2015, 51 countries of the United Nations agreed to implement policies, which will limit global warming to a maximum of a two-degrees Celsius increase compared to pre-industrial levels[1]. Citizen support for these policies is crucial for their success. However, gathering support for climate change policies has been one of the greatest struggles in the environmental movement (Dietz et al., 2007: 187).

For years, the dominant strategy has been to present the science and negative consequences of climate change in compelling ways, and to highlight environmental benefits of climate change policies to the public (Bain et al., 2015: 1). Presenting environmental benefits is referred to as an *environmental frame*.

A frame puts information into a specific context and can influence attitudes by exposing the audience to certain aspects of the issue at hand (Chong and Druckman, 2007). For example, in climate change, a frame can focus on national security by directing the attention of the audience to the threats that climate change may cause to a country. These treats are usually flooding, severe storms, and a shortage of food (Hulme, 2009: 229). Another frame in climate change may focus on the financial aspects. This frame focuses on the costs of the climate change policies, for example the subsidization of green energy. These costs are often compared to the costs of the consequences of climate change, for example the costs of a flood or severe storm.

The environmental frame focuses on the scientific information regarding climate change: rising temperatures, melting ice, rising sea level, and severe storms. The environmental frame also highlights the environmental benefits of climate change policy: less air and water pollution, a lower rise in temperature and sea level. The environmental frame has been successful in the past, but its success has stalled and climate change policy support has stagnated (Bain et al., 2015 and Dietz et al., 2007).

The stalled success of the environmental frame can be explained by two factors. Firstly, the environmental frame talks about global consequences of climate change which lie in the future. The problem with this is that people are generally more sensitive to costs and benefits, which are in a nearby location and lie in the present (Trope and Liberman, 2010). Costs and benefits are most effective when they are *up close and personal*. Secondly, recent studies find that the environmental frame is only effective for people who believe in climate change, but fails to convince people who are critical or sceptical towards climate change (Bain et al., 2015 and UN Development group, 2013). The environmental frame is thus unsuitable for climate change critics as it cannot convince them on the urgency to limit climate change and on the need for climate change policies.

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[1] UN conference on Climate Change (2015), '*Paris Agreement – Long live the planet. Long live humanity. Long live life itself*', http://www.cop21.gouv.fr/en/195-countries-adopt-the-first-universal-climate-agreement/, Last visited on 24/10/2016.

## 1.2 A possible solution – The gain frame.

Bain et al. (2015) sidestep both problems by using co-benefits. Bain et al. (2015) find that highlighting co-benefits of acting on climate change increases environmentally friendly behaviour. Co-benefits do not rely on changing one's belief in climate change as they play into personal values such as egoism and altruism. Furthermore, co-benefits bring benefits of acting against climate change to the present time.

By highlighting the co-benefits instead of environmental benefits, the information frame by which citizens are informed, shift from an *environmental frame* to a *gain frame*. In this study, a *gain frame* refers to a frame in which co-benefits are addressed.

Bain et al. (2015) look at the effect of co-benefits on the willingness to act against climate change. The finding is that co-benefits appeal to all people, both climate change critics and non-critics, and motivates them to act against climate change (Bain et al., 2015: 1). Furthermore, Bain et al. (2015) find evidence that financial co-benefits are the strongest motivation for action, while health co-benefits are the weakest (Bain et al., 2015: 3).

The findings of Bain et al. (2015) open new doors for gathering support for climate change policies. If the use of a gain frame is indeed effective for both climate change critics and non-critics, this could be a solution to the problem of the stagnation in support for climate change policies. A gain frame would then especially increase support by climate change critics since these are left unpersuaded by the environmental frame, while also causing an increase in policy support by non-critics. This seems like an ultimate solution, but can one frame really be used to increase support for all people, both critics and non-critics?

## 1.3 The gap in the literature – Including a loss frame and a health and financial topic.

It seems likely that changing the focus from environmental costs and benefits to personal costs and benefits is effective for climate change critics. However, the effectiveness for non-critics seems less convincing as these people are likely to be concerned about the environmental consequences. In this study, I therefore test the external validity of the theory of Bain et al. (2015) by looking at the effect of framing on non-critics. The theory of Bain et al. (2015) has only recently been published. This means that the full extent and impact of the theory has not (yet) clear. I test and extend the theory of Bain et al. (2015) by making four contributions.

Firstly, I use a sample of non-critics to test the external validity of the theory of Bain et al. (2015). Bain et al. (2015) claim that co-benefits motivate both climate change critics and non-critics to act against climate change. In this study, I test if framing can increase climate change policy support in non-critics. The reason for testing this theory on non-critics is related to the theory of framing. This theory suggests that a frame needs to correlate with the values and beliefs of the audience (Dietz et al., 2007). Therefore, the finding of Bain et al. (2015) that the gain frame fits all; both critics and non-critics needs to be extensively tested.

Secondly, although studies suggest that *loss framing* may have a stronger effect than gain framing, Bain et al. (2015) do not take loss framing into account. Studies have found that negative information gets processed more thoroughly than positive information. This is called the negativity bias (Baumeister et al., 2001). The literature is unclear on the direction of the effect of loss framing. There are both studies suggesting a positive and negative effect (Van Dam, 2016 and Olsen, 2015). In this study, I extend the theory of Bain et al. (2015) by including loss framing. To clarify this relationship, I add a loss frame and study the direction of the effect of loss framing on policy support.

In short, a *loss frame* is the mirror image of a gain frame. It entails the same information, but the information is presented in a negative context. Instead of using co-benefits, a loss frame uses co-costs. Co-costs are the opposite of co-benefits; they are personal and community costs of not engaging in mitigating behaviour. Examples of co-costs are an increasing higher cost of fossil fuel energy and a shortage of food due to longer periods of drought.

Thirdly, there is a gap in the literature regarding the effect of different types of co-benefits and co-costs (Bain et al., 2015; Smith and Haigler, 2008; Wilkinson et al., 2009; and Smith et al., 2013). Bain et al. (2015) acknowledge the need for distinction between types of co-benefits and include different topics of co-benefits in their study. They find that financial co-benefits are the most effective in motivating people to act against climate change, while health co-benefits are the least effective (Bain et al., 2015). There is no literature about the effect of different types of co-costs on climate change policy support.

To close this gap in the literature and to investigate which frame with which topic is the most effective in gathering policy support, I compare two different substantive topics within the frames: a health and financial topic to see which topic is the most effective. Furthermore, I look at the effect of a topic in combination with a gain and loss frame to determine the most effective frame in terms of gathering policy support.

Finally, I connect the 'values-belief-norms' (VBN) theory with the theory of framing. The VBN theory assumes that personal values of altruism and egoism are the most stable determinants of environmental concern (Dietz et al., 2007: 187 and Stern et al., 1999). The theory of framing suggests that framing works best when the frame connects with the existing personal values (Chong and Druckman, 2007). Connecting these theories suggests that altruistic people would be best persuaded to support a climate change policy by informing them about benefits to the society, benefits for future generation, and benefits for animals. On the other hand, focussing on direct financial benefits such as cheaper energy would better persuade more egoistic people. I test this by looking at the effect of different frames across people with different altruistic and egoistic values.

## 1.4 Contribution – Is framing effective in gathering climate change policy support?

Because of their strong potential to determine causal relationships, this study uses an experimental design (Morton and Williams, 2010: 5-13). In this design, 211 respondents participate in an internet questionnaire. By using a homogeneous sample of the alumni Department of Public Administration of the Utrecht School of Governance in the Netherlands, I allow for a strong internal validity, which allows me to determine the effect of framing.

The findings of this study have a theoretical and social relevance. The theoretical relevance lies in three findings. Firstly, gain and loss framing decreases climate change policy support compared to the environmental frame for non- critics. This means that the finding of Bain et al. (2015) in which a gain frame is effective in motivating both critics and non-critics to engage in environmentally friendly behaviour, is not effective for gathering climate change support. Furthermore, there is contradicting information in the literature regarding the direction of the effect of a loss frame on policy support. This study finds that a loss frame has a significant negative effect on policy support compared to the environmental frame. Secondly, contrary to Bain et al. (2015), I find no significant difference between a health and financial topic. Finally, I do not find any significant relationship between egoistic and altruistic values in relation to different frames.

The findings of Bain et al. (2015) are somewhat contradicting to the theory of framing. According to the theory of framing, a frame needs to correspond with the belief system of the audience, while Bain et al. (2015) state that one frame is effective for two belief systems: belief and non-belief in the problem of climate change (Dietz et al. 2007). This study confirms the theory of framing by adding a very important finding: if a frame does not correlate with one's belief system, the frame has a negative effect. I find, that a frame which highlights personal costs and benefits of a policy, while the person is concerned about the environmental costs and benefits of climate change, the frame decreases policy support.

This leads to the social and practical relevance: can the problem of stagnated support for climate change policies be solved with framing? I find that framing is not an appropriate solution as it decreases policy support for non-critics. Even if framing is effective for critics, the positive effect in support by using a frame will be (partly) compensated by a decrease in support by non-critics. This finding suggests that there may not be one way to increase policy support for all citizens and further research is necessary to determine if combining different frames or using different frames for people with different values and beliefs is a more effective way to gather climate change policy support.

# 2   Theoretical Framework

## 2.1 The complex problem of climate change.

Gathering support for climate change policies is the key struggle in the environmental movement (Dietz et al., 2007: 187). Communicating environmental benefits of policies have had limited success. The public's doubt and confusion towards climate change has contributed to non-action and to the limited support for government action (Dietz et al.,2007:186). Climate change policy is often costly and intrusive (Dietz et al.,2007:187). For example, on an individual level, higher fossil fuel prices mean less driving or higher transportation costs.

To understand why communicating on environmental benefits has limited success in gathering support for climate change policies, and why climate change policies are often costly and intrusive, we must look at the complex nature of the problem of climate change.

Climate change is a complex problem. Climate change is not new; the climate has always been subject to change due to natural causes, e.g. orbital forcing, solar forcing, and volcanic forcing (NOAA, 2016 and Harrison & Bartlein, 2012). However, the recent warming of the Earth cannot be explained solely by natural causes. Due to human activities, such as agriculture and the burning of fossil fuels, the concentration of greenhouse gas in the atmosphere has increased. This led the global temperature to rise (IPCC for Policymakers, 2014). Since Earth's climate has always been subject to change, many people struggle with the idea that the recent change in climate is (partly) due to human action (Pew Research Centre, 2014).

The human causes of climate change, such as agriculture and the burning of fossil fuels, are very broad activities. These activities play big parts in our daily lives: we use electricity, eat meat, use cars and planes, and buy goods often made in factories using fossil fuel. These activities lead to the emission of greenhouse gasses. Greenhouse gasses lead to global warming and climate change (IPCC for Policymakers, 2014). Policies aimed at limiting climate change need to limit the emission of greenhouse gasses. Consequently, these policies have a big impact on our society and daily lives. For example, to replace fossil fuel energy with green energy, a huge investment in green energy sources such as solar panels and windmills needs to be made. This also includes changes such as replacing fossil fuel cars with electrical cars. The extent of these changes and the associated costs reduces the willingness of people to support these policies (Dietz et al., 2007).

Another difficulty in gathering support lies in the complex nature of the location and time span of climate change and its consequences. Climate change has a time inconsistency. Causes of climate change lie in the present, while the consequences of climate change lie mostly in the future. This also means that the costs of limiting climate change lie in the present, while benefits lie mostly in the future.

Location wise, climate change crosses borders (Andonova, 2009). Countries emitting greenhouse gasses are not necessarily the countries that will be affected by climate change. Furthermore, the exact location, scope, and severity of the climate change consequences, such as extreme storms, rainfall, and drought, are almost impossible to predict.

Psychological research has found that these aspects of climate change make it difficult for people to grasp the importance and urgency of fighting against climate change. Many studies have found that people react more strongly to consequences that are 'here and now', rather than 'there and in the future' (Trope, Liberman and Wakslak, 2007 and Van Dam, 2016: 13). For example, people react stronger to the prediction that there will be a storm in their own city next week, than the possibility of a storm next year in a country at the other side of the world.

Psychological research has also pointed out that people favour benefits in the present, to benefits in the future, even if the benefits in the future are higher (Trope and Liberman, 2010). For example, people favour being able to use their fossil fuel car now causing air pollution than enjoying the benefits of cleaner air in the future and not using a car now.

To sum up, bringing the costs and benefits to the 'here and now' and to a more personal level, helps people with processing and understanding the information and motivates people to act. This is one of the reasons why the success of highlighting environmental benefits to gather policy support is limited.

In this study, I look at alternative ways to communicate about climate change policies by taking the complex nature of the problem of climate change into account. These alternative ways include gain and loss framing, which are explained in 2.3. I then test if these alternative frames are more successful in gathering policy support than highlighting the environmental benefits. The next section is about policy support.

## 2.2 Climate change policy support.

Many scholars measure policy support by simply asking participants to which extent they support a policy. Usually this is on a Likert scale (Ding et al, 2011; Dietz et al, 2007, and Zahran et al, 2005). However, this does not capture the different facets of the concept of policy support. Policy support has two important facets: *agreement* with a policy and *acceptance* with a policy (Nilsson et al., 2004, Chen and Zhao, 2013, and Fine Licht, 2014).

Level of agreement relates to the correlation between the underlying values of the policy and the values of the person. If the correlation is high, a person is likely to perceive the policy as rational and will encourage the implementation of the policy (Chen and Zhao, 2013). The person is then willing to work towards its success. This is an important aspect in climate change policies, as major changes need to be carried by a large number of citizens.

If a person's personal values are not the same as the underlying values of the policy, the level of agreement is lower. A lower agreement level can still mean that a person will accept the policy, or at least, will not protest against the policy. The level of acceptance has two sub facets: the willingness to accept and the willingness to protest.

A real problem for the policy arises if the personal values are in opposition to the underlying values of the policy. This decreases the willingness to accept and increases the willingness to protest. This can lead to sabotage or protest and demonstrations against the policy.

Figure one shows the conceptualisation of policy support. In this study, policy support is defined as *"the level of agreement and acceptance the participant has or feels for a climate change policy"*.

*Figure one: Conceptualisation of policy support.*
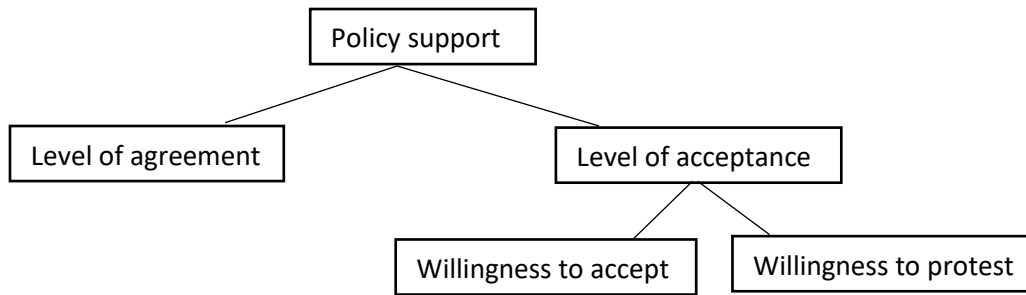


Many scholars have studied factors, which influence policy support (Stern et al, 1999; Stern, Dietz, and Kalof, 1993; O'Conner et al., 2002; and Uyeki and Holland, 2000). Focussing on support for climate change policies, the literature offers three dominant theories which are complementary to each other: the norm activation theory, the theory of personal values, and the new ecological paradigm theory (Stern et al., 1999).

In short, these theories suggest that an individual's personal characteristics, personal values, knowledge, beliefs on climate change, and trust in scientists, the government, and the industry, influences their support for a climate change policy (Schwartz, 1987, 1992, and 1994; Stern et al., 1999; Dietz et al., 2007; Pike et al., 2010).

Besides the above-mentioned factors, how information about a policy is communicated also plays a role in policy support.

## 2.3 The theory of framing

For years, the dominant strategy of communicating about climate change policies is to highlight the environmental benefits of the policy (Bain et al., 2015). This is referred to as the *environmental frame*. As explained in 2.1, this frame has had limited success in gathering support for climate change policies (Bain et al., 2015). In this study, I take the complexity of the problem of climate change into account and bring the costs of climate change and the benefits of acting against climate change to the 'here and now'. I do this by looking at two alternatives to the environmental frame*: the gain and loss frame.*

In our daily life, information is constantly framed. Media, the government, and other people present or form information in a specific context when communicating. Frames get used to interpret, construct, and to present information (Lakoff, 2010: 71 and Shah et al, 2002: 343). Framing is defined as: "*The process by which people develop a particular conceptualization of an issue or reorient their thinking about an issue*" (Chong and Druckman, 2007: 104).

A framing effect occurs when the context or interpretation gets stored in someone's memory which can easily be accessed at a later time (Chong and Druckman, 2007: 110). This happens through an unconscious or passive process (Higgins, 1996). Framing effects occur on three levels: by making new believes, by making certain believes assessable, or by making believes applicable (Chong and Druckman, 2007: 111).

Framing can be used to convince people on a certain standpoint, but it can also be used to make information accessible and to reduce complexity (Scheufele and Tewksbury, 2007). A frame can reduce complexity by playing into existing schemas of language use and context (Gans, 1979).

Presenting essentially identical information in different frames influences people's choices, evaluation, and opinions (Scheufele and Tewksbury, 2007). When people process new information, individuals look at their 'primary framework' (Goffman, 1974). This primary framework is the set of beliefs and personal values of an individual. A frame needs to play into people's personal values and beliefs to be successful in their task of communicating a certain issue or standpoint. The media often choses a frame, which resonates with the primary framework of their audience.

In this section, I further explain the use of the dominant environmental frame in the arena of gathering climate change policy support. I explain two alternative frames: a gain and a loss frame. I explain why these frames may have a better change in gathering climate change support than the environmental frame. Furthermore, I use two topics in these frames: a health and financial topic. I explain this choice and the expected effect of these topics on policy support. Finally, I look at the relationship between these frames and the personal values of people.

### 2.3.1   The environmental frame.

As said, the dominant frame in communicating about climate change policies is the environmental frame (Bain et al., 2015). This frame focuses mainly on scientific information about the causes of climate change and the impacts. Usually these impacts are on a global scale and are situated in the future.

The limited success of the environmental frame can be explained by two factors. Firstly, the environmental frame communicates on global environmental benefits of acting against climate change. Costs of achieving these benefits are high and lie in the present. As explained in 2.1, psychological research shows that people are not easily persuaded by costs or benefits, which lie the future (Trope and Liberman, 2010). Secondly, climate change policy support depends on personal values and belief in climate change (Dietz et al., 2007). Recent studies find that the environmental frame has proven to be ineffective for people who are unconvinced about climate change (Bain et al, 2015, Pew Research Centre, 2014, and UN Development group, 2013).

It is extremely difficult to change someone's personal values or to shift someone who is unconvinced about climate change to being convinced. This is due to four reasons: the conformation bias, misplaced confidence, wishful thinking, and belief polarization (Pike et al, 2010: 7). The conformation bias states that people focus on evidence that confirms their own existing beliefs and ignore and reject evidence that contradicts their beliefs. The misplaced confidence relates to the easiness to belief that the future will look similar to the past and present. Wishful thinking refers to the belief that positive outcomes are more likely to happen than negative ones and 'belief polarization' means that people tend to associate only with people who share their own beliefs (Pike et al, 2010: 7).

### 2.3.2   The gain and the loss frame.

To overcome the two limiting factors in the success of the environmental frame, I build on the theory of Bain et al. (2007). Bain et al. (2007) sidestep these two factors by focusing on co-benefits. Co-benefits are personal and community benefits that result from mitigating behaviour such as using green energy instead of fossil fuel (Bain et al., 2015). Examples of co-benefits are technical developments, job creation, cheaper energy, and a continuous energy source (Bain et al., 2015: 1).

Bain et al. (2015) find that addressing co-benefits is effective in motivating people to act against climate change. Co-benefits increase motivation in both climate change critics as non-critics (Bain et al., 2015). Furthermore, co-benefits bring benefits of acting against climate change to the present time and make the benefits more personal (Spence and Pidgeon, 2010: 7). Addressing the co-benefits of adopting a climate change policy is called a *gain frame*. Bain et al. (2015) suggest that one frame is effective for two sets of belief systems: the belief in climate change and the disbelief in climate change. This is very interesting as it goes against the theory of framing which suggests that, for a frame to be effective, it needs to correlate with the belief system of the audience (Dietz et al., 2007).

A gain frame addresses the co-benefits of adopting a climate change policy. For example, subsidizing solar panels leads to cheaper energy for citizens as the solar panels can be (partly) used to satisfy their energy need (a financial co-benefit) and leads to cleaner air and decreasing health risks such as asthma (a health co-benefit).

Several studies suggest that *loss framing* may have a stronger effect than gain framing. Bain et al. (2015) have not included a loss frame in their study. Since the effect of a loss frame may be stronger, I include a loss frame. A loss frame is the mirror image of a gain frame. It entails the same information, but the information is presented in a negative context. Instead of using co-benefits, a loss frame uses co-costs. Co-costs are the opposite of co-benefits; they are personal and community costs of not engaging in mitigating behaviour. For example an increasing higher cost of fossil fuel energy. In the example of the policy to subsidize solar panels, a loss frame states that *not* subsidizing solar panels causes energy prices to remain relatively high with relatively high price fluctuations (a financial co-cost) and leaves the air pollution relatively high which can cause health issues like asthma (a health co-cost).

The mechanism behind the success of the gain and loss frame in motivating people to act against climate change lies in one's personal values. Gain and loss frames play into relative egoistic and altruistic values instead of focusing on convincing citizens on the reality, importance and consequences of climate change (Bain et al., 2015).

A climate change critic, for example, may not support the policy of subsidizing solar panels because this person does not believe that fossil fuel is harmful. However, regardless of environmental implications, depending on one's levels of relative egoistic and altruistic values, this person will support the policy for personal financial and/or health reasons. For a person who does believe in climate change, these co-benefits or co-costs form an extra motivation to support climate change policy.

The theory of Bain et al. (2015) is that co-benefits increase the willingness to act against climate change for both climate change critics and non-critics. As climate change policies are a form of acting against climate change, the expectation is that these frames increase climate change policy support. This leads to the first hypothesis.

**H₁:** *Framing information about climate change policy by using a gain or loss frame results into more policy support compared to the environmental frame.*

The environmental frame focuses on environmental benefits, which are mostly in the present time, and on a global scale. A gain and loss frame brings the co-benefits and co-costs of a climate change policy to the present and to a more personal level. The question that remains is how these frames compare to each other in terms of gathering climate change policy support.

According to recent studies of Van Dam (2016) and Olson (2015), the effect of a loss frame has a stronger impact than that of gain frame. Olson (2015) found that informing people of a 90% satisfaction rate has a stronger positive effect on evaluations, than informing people of a 10% dissatisfaction rate. Therefore, positive information has a more positive impact on people's perception of reality than negative information.

Van Dam (2016) found that labelling climate unfriendly products negatively leads to a lower consumption of these products compared to the increase of consumption in products with a positive environmental label. Van Dam (2016) explains that focusing on the negative consequences brings these costs to mind, which leads them to be perceived in the near future. This leads to less consumption for climate unfriendly products.

Baumeister et al. (2001) explain that loss framing has a bigger impact than gain framing, because bad information gets processed more thoroughly than good information. This is explained in the negativity bias of Rozin and Royzman (2001), which has four main aspects: the negative potency, greater steepness of negative gradients, negative dominance, and negative differentiation (Rozin and Royzman, 2001: 298).

In short, negative information has greater impact than positive information. There is no literature on the effect of loss framing on climate change policy. The above literature by Van Dam (2016) suggests that co-costs would increase support, as the consequences of not implementing the policy will make more impact than the benefits of implementing the policy. On the other hand, the findings of Olson (2015) suggest a decrease in support when using a loss frame. Baumeister et al. (2001) and Rozin and Royzman (2001) predict a stronger effect with loss framing than with gain framing.

Due to contradicting findings in above studies, the second hypothesis only predicts that loss framing will have a greater effect than gain framing, but cannot make any prediction regarding the direction of the effect. The second hypothesis is therefore:

**H₂:** *The loss frame has a stronger (positive or negative) effect on policy support than the gain frame.*

### 2.3.3   The health and financial topic.

There is a gap in the literature regarding the effect of different topics in gain and loss frames. Furthermore, there is no literature, which compares the effect of using a loss or gain frame with the effect of varying between different topics. I contribute to the literature by including a health and financial topic in both the gain and loss frame, and examine the effect of these variations on policy support.

Bain et al. (2015) acknowledge that most studies do not look at different types of co-benefits. Therefore, little is known about the effect of different co-benefits. Examples of different co-benefits of climate change policies are economic development, scientific progress, and less pollution. Bain et al. (2015:2) distinguish four dimensions of co-benefits: development, dysfunction, benevolence, and competence.

In the use of a gain frame, Bain et al. (2015: 3) find that financial co-benefits are the strongest motivator to fight against climate change, while health co-benefits are the weakest. This finding is in agreement with the above literature, which states that people prefer benefits, which are in the present, rather than benefits in the future (Trope and Liberman, 2010). Financial benefits are often visible in an earlier stage than health benefits. Health benefits, for example, often result from less air and water pollution, which follows a slower route than financial benefits. Therefore, the expectation is that a financial topic is more effective in gathering policy support in both the loss and gain frame.

This study extends the theory of Bain et al. (2015) by examining the effect of health and financial topic in a gain frame to gather support and by incorporating the health and financial topic in a loss frame. The third hypothesis is therefore:

**H₃***: The financial topic has a stronger positive effect on policy support than the health topic.*

The fourth hypothesis tests the difference between the effect of varying between a gain and a loss frame compared to the difference in effect of varying between a health and financial topic. The literature on the negativity bias, suggesting a stronger effect to a loss frame than a gain frame is substantial, while the literature on the difference between a health and financial topic is limited. A reason for this may be that the effect of varying in topic may be relative small compared to the effect of varying between the gain and loss frame on support.

To determine the optimal frame in terms of topic and gain or loss context, this study tests the following (explorative) hypothesis:

**H₄:** *The effect of varying between a gain or loss frame is stronger than the effect of varying between a health and a financial topic.*

### 2.3.4   Personal values and frames

Studies have found that personal values and beliefs have a significant effect on climate change policy support (Dietz et al., 2007). These personal values include: altruism, openness to change, egoism, traditional values, and material values. However, Dietz et al. (2007: 205) found that only altruistic and egoistic values have a strong impact on policy support.

The 'values-belief-norms' (VBN) confirms this finding of Dietz et al. (2007) and assumes that personal values of altruism and egoism are the most stable determinants of environmental concern (Dietz et al., 2007: 187 and Stern et al., 1999). I connect the VBN theory with the theory of framing. People with high altruistic values often focus on the common interest of society, nature, and the non-human world (Stern et al., 1999). In other words, people with high altruistic values generally take interest in benefits for society as a whole, but also in benefits for future generations. Nillson et al. (2004) explain that environmentally friendly behavior is a social act, which is related to altruism.

Connecting the VBN theory with the theory of framing, which suggests that framing works best when the frame connects with the existing personal values, the expectation is that people with higher altruistic values will react positively to the environmental frame of highlighting environmental benefits (Dietz et al., 2007 and Chong and Druckman, 2007).

On the other hand, people with higher egoistic values, generally show more interest in personal benefits, also referred to as private benefits, instead of collective benefits (Stern et al., 1999). The expectation is that people with higher egoistic values will react more strongly to the gain and loss frames focused on co-benefits and co-costs, than to the control frame of environmental benefits. This leads to the fifth hypothesis:

**H$_5$:** *Relative egoistic people react positively to a gain or loss frame, while relative altruistic people react positively to the dominant frame of highlighting environmental benefits.*

This hypothesis is mainly an explorative hypothesis due to the limited literature on this subject. Table one presents an overview of the five hypotheses that are tested in this study. The next section will present the experimental design used to test these five hypotheses.

*Table one – Overview of the five hypotheses.*

| Hypothesis | Based on literature by |
|---|---|
| $H_1$: *Framing information about climate change policy by using a gain or loss frame results into more policy support compared to the environmental frame.* | Bain et al. (2015) |
| $H_2$: *The loss frame has a stronger (positive or negative) effect on policy support than the gain frame.* | Bain et al. (2015)<br>Baumeister et al. (2001)<br>Olsen (2015)<br>Rozin and Royzman (2001)<br>Van Dam (2016) |
| $H_3$: *The financial topic has a stronger positive effect on policy support than the health topic.* | Bain et al. (2015)<br>Trope and Liberman (2010) |
| $H_4$: *The effect of varying between a gain or loss frame is stronger than the effect of varying between a health and a financial topic.* | (Explorative) |
| $H_5$: *Relative egoistic people react positively to a gain or loss frame, while relative altruistic people react positively to the dominant frame of highlighting environmental benefits.* | (Explorative)<br>Chong and Druckman (2007)<br>Dietz et al. (2007)<br>Nilson et al. (2004)<br>Stern et al. (1999) |

# 3    Methodology

## 3.1 An experimental design and solar power as climate change policy.

This study follows an experimental design by using an internet survey experiment (Morton and Williams, 2010: 280). An experimental design is appropriate to study causal relationships, e.g. the effect of using different frames on policy support. Internet experiments have the advantage that they allow for a great number of participants and have a greater guarantee of anonymity than non-internet experiments (Morton and Williams, 2010: 307).

This study focuses on the policy of subsidizing solar power. By focusing on one climate change policy, the experimental design allows us to contribute the variance in policy support to the effect of framing. The usage of multiple policies could create the possibility that the measured variance in support is due to different levels of support for different policies.

In the process of determining a suitable climate change policy for this experiment, several policies were considered: compulsory recycling, subsidizing green energy, higher taxes on fossil fuels, and compulsory energy labels for houses. I applied the following three conditions to determine the most suitable policy. Firstly, the policy needs to be well known and not too complicated for people to grasp in the short time period of the experiment. Secondly, the policy must be open for all participants. Thirdly, the policy needs to have clear co-costs and co-benefits.

Based on these considerations, the policy of subsidising green energy is found to be most suitable. Green energy can refer to multiple forms of energy:  solar power, wind energy, biomass energy, and geothermal energy. To prevent different interpretations, one type of green energy is chosen. Biomass and geothermal energy are relatively unknown, and are therefore less suitable. Wind energy requires windmills, which generally speaking, is a topic of controversy. For example, some people do not want windmills near their property, as research shows that this decreases the property value (Kirkpatrick, 2011). The policy of subsidizing solar power is therefore found most suitable. This policy is open to all people, is well known, straightforward, and has clear co-costs and co-benefits.

Solar energy is produced through solar panels. Solar panels transform sunlight into electricity. Citizens and firms can purchase these solar panels. The Dutch government makes purchasing solar panels financially attractive. Energy produced by solar panels can be deployed for personal use. This means that less energy needs to be bought from an energy supplier. When the solar panels produce more energy than is needed for personal use, this energy can be sold to energy suppliers. This creates financial benefits for the owners of solar panels. Furthermore, the Dutch government subsidizes solar energy by offering tax rebates and low rent loans to purchase solar panels[2].

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[2] De Rijksoverheid (2016), '*Duurzame energie*', https://www.rijksoverheid.nl/onderwerpen/duurzame-energie, Last seen on 30/10/2016.

## 3.2 Sample

The sample consists of a total of 223 respondents in The Netherlands. Twelve respondents were excluded from the analysis due to problems with loading of the website or with the instructional manipulation checks. The analysis is performed on 211 respondents. The characteristics of the sample can be found in table two.

The participants are members of a panel of alumni of the Department of Public Administration of the Utrecht School of Governance in the Netherlands. All results are anonymous. Because knowledge about the different frames may influence their reaction to the frame and alter the results, participants are not informed on the purpose of the study until after the experiment (Morton and Williams, 2010: 307).

*Table 2 – Characteristics of the overall sample*

|  | N=211 |
|---|---|
| **% Male** | 48% |
| **Average age (sd)** | 38 (12) |
| **% (Moderate) Left wing orientated** | 63% |
| **Belief in climate change (sd)\*,\*\*** | 4,6 (1,1) |
| **Altruistic value\*\*\*** | 6,0 (0,64) |
| **Climate change policy support (sd)\*** | 5,9 (1,0) |

\* On a scale of 1 (minimum) to 7 (maximum).
\*\* 5 participants classify as real climate change critics with a score of below 3.5.
\*\*\* 2 participants classify as low altruistic with a score of below 3.5.

This sample is not representative for the population of the Netherlands. The people in this sample are relatively highly educated; politically left wing orientated, and show high levels of altruism, climate change belief, and policy support. It should also be noted that this sample contains only five participants, who are climate change critics; this means that no conclusions can be made about the effect of framing on climate change critics. The same problem arises with altruistic values as only two participants show low altruistic values.

Though the sample is not representative for the Dutch population, the sample is useful for the purpose of this study. Due to its homogeneity, the sample can be used to examine if framing can increase policy support. A uniform group of participants allows for a strong internal validity, as other variables are kept relatively constant (Bain et al., 2015). Furthermore, due to the high number of climate change believers, the effect of framing on non-critics can be examined.

To sum up, this study focusses on non-critics and contributes to the literature by testing the applicability of the theory of Bain et al. (2015) in the arena of gathering policy support. This is done by extending this theory to the area of gathering policy support, by including a loss frame, a health and financial topic, and by testing if the finding of beneficial effects of a gain frame in both critics and non-critics, hold in this sample.

## 3.3 Procedure

The general experimental procedure consists of three elements: (1) Instructions to the experiment and three introduction questions, (2) the manipulation in the form of five websites presenting different frames though which information about the policy is presented, and (3) the post-test questionnaire. These three elements are explained.

1. At the start of the experiment, the participants receive a short instruction to the experiment. They are asked to answer three introduction questions, then to read the text on the website carefully, and then to fill in the rest of the questionnaire. The three introduction questions are meant to catch the attention of the participants and to gather information on background variables.

2. The manipulation. Participants are randomly assigned one out of five websites. These websites are designed to mimic the website of the Dutch Government (appendix A). Each website contains a different frame: the environmental frame, the financial gain frame, the financial loss frame, the health gain frame, and the health loss frame.

   The structure of the frames consists of three parts: (1) a general paragraph about the policy of subsidizing solar energy; this paragraph is the same in each frame, (2) a sentence stating that the policy has environmental, health, or financial co-benefits or co-costs, and (3) a paragraph explaining these benefits or costs. Elements two and three are different in each frame.

   Frames can put information into context by the use of language, visual material, focussing on certain aspects of the issue, or by relating the information to other events or views (Chong and Druckman, 2007). This study uses the third aspect of this, focussing on certain aspects, namely the co-benefits and co-costs. By excluding aspects such as visual and audio material, the framing effect of the co-benefits and co-costs on policy support can be measured. The texts are as identical as possible and contain between 100 and 116 words.

   The gain and loss frames are mirrors of each other and focus on health and financial co-benefits and co-costs. The texts have been altered exclusively on critical aspects concerning the presentation of the co-benefits and co-costs. Table three gives an example[3]. See appendix A for the full text of the frames and the graphical layout.

   *Table 3 – Example of the alteration between the health gain frame and the health loss frame.*

   | Health gain frame | Health loss frame |
   |---|---|
   | **The use of** solar energy instead of fossil fuel **creates** *cleaner air* **with less** particulate matter. | **Without the use of** solar energy instead of fossil fuel, **the** *air stays polluted* **with** particulate matter. |

---

[3] The texts used in the experiment are in Dutch. Dutch is the mother tongue of the respondents. To prevent possible problems in translation between the respondents, the decision was made to perform the experiment in Dutch. In table two, the texts are translated into English for the benefit the international legibility.

3. The post-test questionnaire (the questions asked after the manipulation). To measure the effect of the manipulation in policy support, the questions about policy support are asked after the manipulation. Furthermore, to prevent selective reading, questions regarding pre-knowledge and belief in climate change, are presented to the respondents after the manipulation. The post-test questionnaire contains 27 questions related to pre-knowledge and belief in climate change, policy support, personal values, instructional manipulation checks and several background variables.

## 3.4 Measures

### 3.4.1 Climate change policy support.

Policy support is defined as *"the level of agreement and acceptance the participant has or feels for a climate change policy"*. Therefore, support is measured by two categories: agreement and acceptance.

To measure these dimensions, a total of seven questions are asked on a seven-point scale. These measurements are based on the studies of Chan and Zhao (2013) and Fine Licht (2014). For the analysis, three of these seven items were combined: '*I support the policy to subsidize solar energy', 'I hope the policy of subsidizing solar power continues in the future',* and *'I accept the policy to subsidize solar power'*. These three items lead to the highest possible reliability with a Cronbach's alpha value of 0,837 (see appendix B for full questions).

### 3.4.2 Personal values.

Personal values and belief in climate change have proven to effect policy support (Schwartz, 1987, 1992, and 1994; Stern et al., 1999; Dietz et al., 2007; Pike et al., 2010, and Ding et al., 2011). Changing personal values and belief in climate change is extremely difficult.

Dietz et al. (2007) study several personal values in relationship to policy support and find that egoistic and altruistic values have a strong impact on policy support. The advantage of framing information in terms of co-benefits and co-costs is that these may play into egoistic and altruistic values of people, instead of depending on changing their beliefs on climate change.

Altruistic people are believed to respond better to the environmental frame, while people with stronger egoistic values are believed to respond better to the alternative frames (Dietz et al., 2007). To test this, a distinction between relative egoistic and altruistic people needs to be made. This is done on the basis of four questions regarding altruism ($\alpha$=0,652) (see appendix B for full questions).

The sample generally consists of altruistic people (only 2 participants classify as high egoistic values). Therefore, the choice is made to use a tertile split of altruistic values and classify the lowest tertile as relative egoistic and the highest tertile as relative altruistic. The relative egoists have a mean on 5,7 (0,93) and the relative altruists have a mean of 6,2 (0,85) on a scale of one to seven on altruism. This difference is significant (F(1,137)=9,73, p=0,002. Eta$^2$=0,067).

### 3.4.3 Instrumental manipulation checks and control variables.

Participants do not always follow the instructions to an experiment (Oppenheimer et al., 2009). Participants sometimes (partly) skip reading a text, or are not concentrated enough to be subject to the manipulation. This can cause invalid data (Oppenheimer et al., 2009). To prevent this, I include three checks: (1) I keep track of the time spent reading the text on the website, (2) I keep track of the time spent on the entire questionnaire, and (3) I include a question which is not meant to be answered[4].

Variables such as age, gender, trust in government, and political preference may influence the level of policy support. Left wing orientated people, older people, and females, tend to show higher levels of climate change policy support (O'Conner et al. 2002; and Uyeki and Holland, 2000). Some respondents may have purchased private solar panels. This can potentially also influence support levels. Finally, levels of criticism towards climate change and levels of altruistic and egoistic may have an effect. An unequal distribution of these background variables could potentially threaten the internal validity of this study. Table four shows the distribution of these variables.

*Table 4 – Sample characteristics over the five frames.*

|  | Environmental frame | Financial gain frame | Financial loss frame | Health gain frame | Health loss frame |
|---|---|---|---|---|---|
| **N** | 40 | 44 | 45 | 44 | 38 |
| **% Male** | 50% | 39% | 56% | 57% | 58% |
| **Average age (sd)** | 40,4 (13,7) | 34,8 (9,6) | 38,2 (13,1) | 38,3 (13,0) | 37,5 (11,9) |
| **Trust in government (sd)** | 5,2 (0,9) | 5,1 (0,8) | 4,7 (1,2) | 5,1 (0,9) | 4,9 (1,3) |
| **% (moderate) left parties[1]** | 72% | 45% | 57% | 68% | 65% |
| **% Owns private solarpanels** | 13% | 1% | 1% | 16% | 13% |
| **% Relative climate critic** | 45% | 52% | 52% | 60% | 39% |
| **% Relative altruistic** | 54% | 61% | 39% | 41% | 62% |

1: Follow Klingemann et al. (2006). Left wing as D66, PvdA, GL, SP, PvdD.

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[4] Test have been performed to check whether time spent on the website and survey influences the results. This is not the case. Based on the manipulation check, it became apparent that some participants had not identified the manipulation correctly. Additional tests show that this does not influence the results. This is confirmed by the literature, which states that frames mostly work through an unconscious or passive process (Higgens, 1996).

The average income class is the same in each group (€25.000 to €50.000 annually). A balance test, in which the differences between sample characteristics are analysed, has been performed. Differences between groups in terms of distribution of male/female, age, political preference, private solar panels, relative climate critics, and relative egoistic are not significant[5]. This means that the random assignment of respondents to the websites is successful.

## 3.5 Analysis

For the analysis of the first three hypotheses, a univariate analysis of variance (ANOVA) is performed. An ANOVA is considered suitable as it allows for comparison between several means (Field, 2005). In the first three hypotheses, the means of policy support between the different frames are compared.

The fourth hypothesis looks at both the distinction between the gain and loss frame and at the difference between the two topics, health or financial. The fifth hypothesis investigates the effect of different frames on different groups: relative egoistic people vs. relative altruistic people. For the analysis of these hypotheses, a factorial ANOVA is used. A factorial ANOVA measures if a combination of independent variables (frame, topic, or group) significantly predicts the dependent variable of the experiment (policy support).

All tests are done twice: with and without control variables. Of the control variables, only 'trust in government' is significant (in four out of five hypothesis). Including control variables and obtaining the same results is known as a positive statistical robustness check and increases the reliability of the results.

The robustness check is performed by using a univariate analysis of covariance (ANCOVA). An ANCOVA is used when there are variables, such as 'trust in the government', that are not part of the experimental manipulation, but do have an effect on the dependent variable (policy support). These variables are called covariates (Field, 2005: 479). In an ANCOVA, the effect of these covariates is controlled for, before looking at the effect of the experimental manipulation (the effect of frames). The robustness check is presented in appendix C.

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[5] Based on Pearson's chi-squared test.

# 4   Results

## 4.1 Results of analysis.

The analysis shows that the frame significantly influences policy support ($F_{(4,206)}=3,09$, $p=0,017$, $eta^2=0,057$)[6]. The average policy support over the five frames is presented in table five and figure two. The environmental frame gathers the highest level of policy support, while the financial loss frame gathers the least. In hypothesis one, two, and three, the differences in policy support are further explored by looking at the influence of gain and loss frames and of the health and financial topic[7].

*Table 5 – Average policy support per frame.*

|  | Environmental frame | Financial gain frame | Financial loss frame | Health gain frame | Health loss frame |
|---|---|---|---|---|---|
| **N** | 40 | 44 | 45 | 44 | 38 |
| **Average policy support (SE)[1]** | 6,3 (0,15)[a] | 5,9 (0,14)[b] | 5,7 (0,14)[b] | 6,1 (0,14)[a] | 5,8 (0,15)[b] |

*1:  On a scale of 1 (minimum) to 7 (maximum).*

*Figure two – Average policy support per frame.*
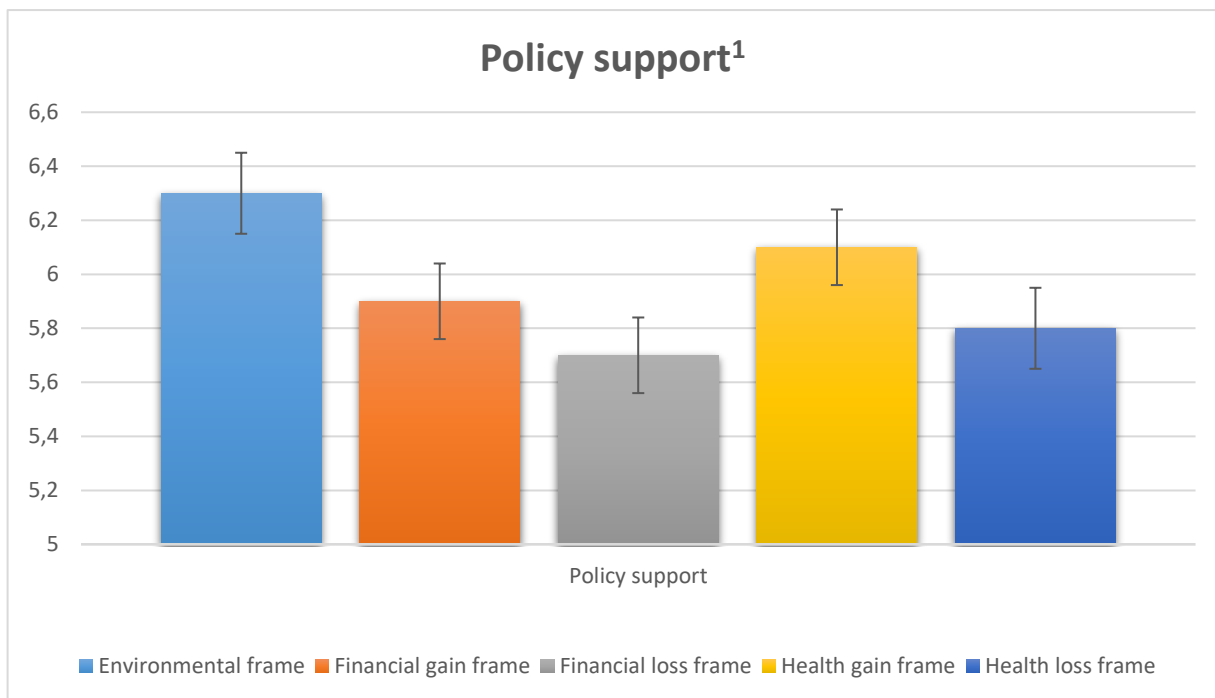


*1: Policy support on a scale of 1 (minimum) to 7 (maximum).*

---

[6] Robustness analysis: the effect of the frame on policy support is also significant when the control variables are taken into account ($F_{(4,102)}=3,987$, $p=0,005$, $eta^2 = 0,135$).

[7] All analyses are performed twice, with and without the control variables. Including these control variables does not lead to different results in terms of the significance and direction of the effects. Analyses with control variables are presented in the robustness analysis in appendix C.

The results of each hypothesis will be discussed separately.

$H_1$: *Framing information about climate change policy by using a gain or loss frame results into more policy support compared to the environmental frame.*

The analysis shows that there is a significant difference between support in the environmental frame and the alternative frames (F(1,209)=7,314 p=0,007, $Eta^2$=0,034). However, contrary to the expectation, policy support decreases with the use of an alternative frame by an average of 7,6% (p=0,05)[8]. Therefore, the hypothesis is disconfirmed. Table six shows the ANOVA results[9].

*Table 6 –ANOVA results for Hypothesis one.*

|  | Environmental frame (N=40) | Alternative frame (N=171) | Difference |
|---|---|---|---|
| **Policy support (SE)[1]** | 6,31 (0,15)[a] | 5,86 (0,07)[b] | -0,449 (0,07) |

*1:  On a scale of 1 (minimum) to 7 (maximum).*

$H_2$: *The loss frame has a stronger (positive or negative) effect on policy support than the gain frame.*

The analysis shows that comparing the loss frame with the gain frame does not result into a significant difference in policy support. However, comparing both frames with the environmental frame, the loss frame gathers significantly less support than the environmental frame (F(2,208)=5,41, p=0,005, $eta^2$=0,049). On average, the loss frame gathers 9,9% less support than the environmental frame[10].

The gain frame shows no significant difference in support with the control frame (p=0,076). This means that the loss frame gathers the least support (see table seven and figure three).

The hypothesis is confirmed; the loss frame has a stronger effect on policy support than the gain frame. The effect of the loss frame is negative[11].

*Table 7 –ANOVA results for Hypothesis two.*

|  | Environmental frame (N=40) | Loss frame (N=83) | Gain frame (N=88) |
|---|---|---|---|
| **Policy support (SE)[1]** | 6,31 (0,15)[a] | 5,72 (0,10)[b] | 5,99 (0,10)[a,b] |

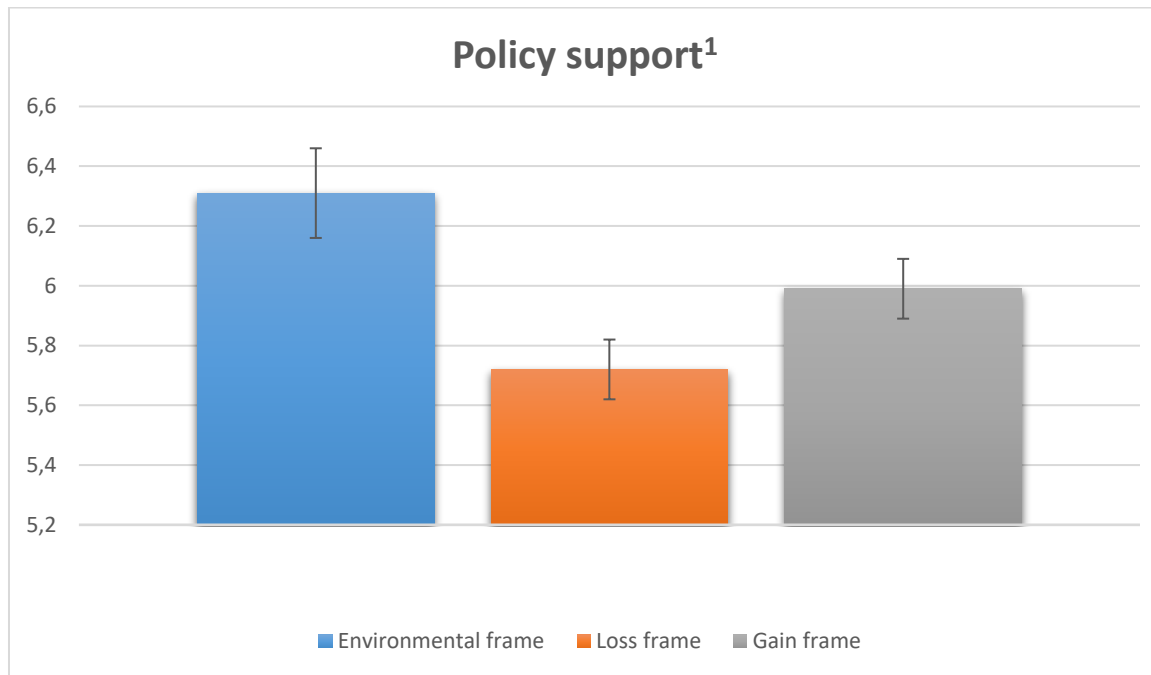*1:  On a scale of 1 (minimum) to 7 (maximum).*

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[8] Based on the average support of the overall sample: 5,9 on a scale of 1 (minimum) to 7 (maximum).

[9] An ANCOVA with 'trust in government' as covariate and an ANCOVA with all control variables as covariates show the same result (F1,208)=6,09 p=0,014, $eta^2$=0,028) and ((F(1,105)=6,18, p=0,014, $eta^2$=0,056). There is significant less support in the alternative frames than in the environmental frame. See appendix C for the full results.

[10] Based on the average support of the overall sample: 5,9 on a scale of 1 (minimum) to 7 (maximum).

[11] An ANCOVA with 'trust in government' as covariate and an ANCOVA with all control variables as covariates show the same result ((F2,107)=4,12 p=0,0018, $eta^2$=0,038) and ((F(2,104)=6,38, p=0,001, $eta^2$=0,109). The loss frame has a stronger negative effect on policy support than the gain frame. See appendix C for the full results.

*Figure three: Policy support distribution over three frames.*



*1: Policy support on a scale of 1 (minimum) to 7 (maximum).*

**H₃***: The financial topic has a stronger positive effect on policy support than the health topic.*

The analysis shows that the effect of the topic in the frames is significant $F(2,208)=4,477$, $p=0,012$, $eta^2=0,041$). However, contrary to the expectation, the financial topic gathers least policy support (see table eight and figure four).

The financial topic gathers 9.1% less support than the environmental topic[12]. This difference is significant ($p=0,002$). There is no significant difference between the health and the environmental topic or between the health and financial topic[13]. Therefore, hypothesis three is disconfirmed.

*Table 8 – Results of ANOVA for Hypothesis three.*

|  | Environmental topic (N=40) | Financial topic (N=89) | Health topic (N=82) |
|---|---|---|---|
| **Policy support (SE)[1]** | 6,31 (0,15)[a] | 5,77 (0,10)[b] | 5,96 (0,10)[a,b] |

*1:  On a scale of 1 (minimum) to 7 (maximum).*

---

[12] Based on the average support of the overall sample: 5,9 on a scale of 1 (minimum) to 7 (maximum).

[13] An ANCOVA with 'trust in government' as covariate and an ANCOVA with all control variables as covariates show the same result ($F(2,107)=3,765$ $p=0,025$, $eta^2=0,035$) and (($F(2,104)=6,38$, $p=0,001$, $eta^2=0,109$). The loss frame has a stronger negative effect on policy support than the gain frame. See appendix C for the full results.

*Figure four: Policy support distribution over three topics.*
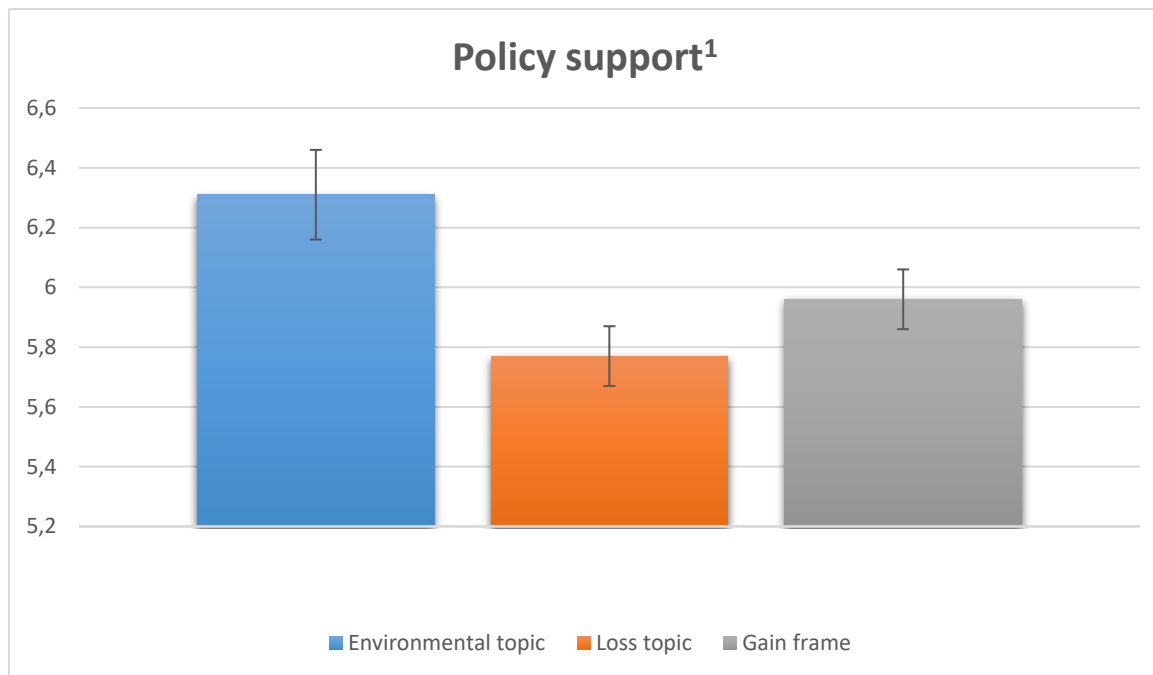


*1: Policy support on a scale of 1 (minimum) to 7 (maximum).*

$H_4$**:** *The effect of varying between a gain or loss frame is stronger than the effect of varying between a health and a financial topic.*

The analysis shows that 'frame' has a significant influence on policy support ($F_{(2,206)}$=3,09, p=0,017, eta$^2$=0,057). A financial loss frame gathers least support compared to the environmental frame (p=0,038). The financial gain frame and health loss frame also gather significant less policy support than the environmental frame (p=0,002 and p=0,016).

To investigate if there is a significant difference between a health and financial topic and between a loss and gain frame and to compare these effects, a factorial ANOVA is carried out (table nine)[14]. Although these results seem to confirm the hypothesis with a loss frame gathering 9% less support than a gain frame and the financial topic gathering only 3% less support than the health topic, these results are not significant ($F_{(1,167)}$=1,27, p=0,262, eta$^2$=0,008) (table nine and figure five)[15].

This analysis shows that there is no significant difference between the gain and loss frames and between the health and financial topics. Therefore, hypothesis 4 is disconfirmed.

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[14] A Bonferroni post hoc analysis is carried out to consider patterns in the data between each frame and each topic. The environmental frame gathers significantly more support than the financial gain frame (p=0,038). The environmental frame gathers significantly more support than the financial loss frame (p=0,002). The environmental frame gathers significantly more support than the health loss frame (p=0,016). The environmental topic gathers significantly more support than the financial topic (p=0,002). No other relationships are significant.
[15] Based on the average support of the overall sample: 5,9 on a scale of 1 (minimum) to 7 (maximum).
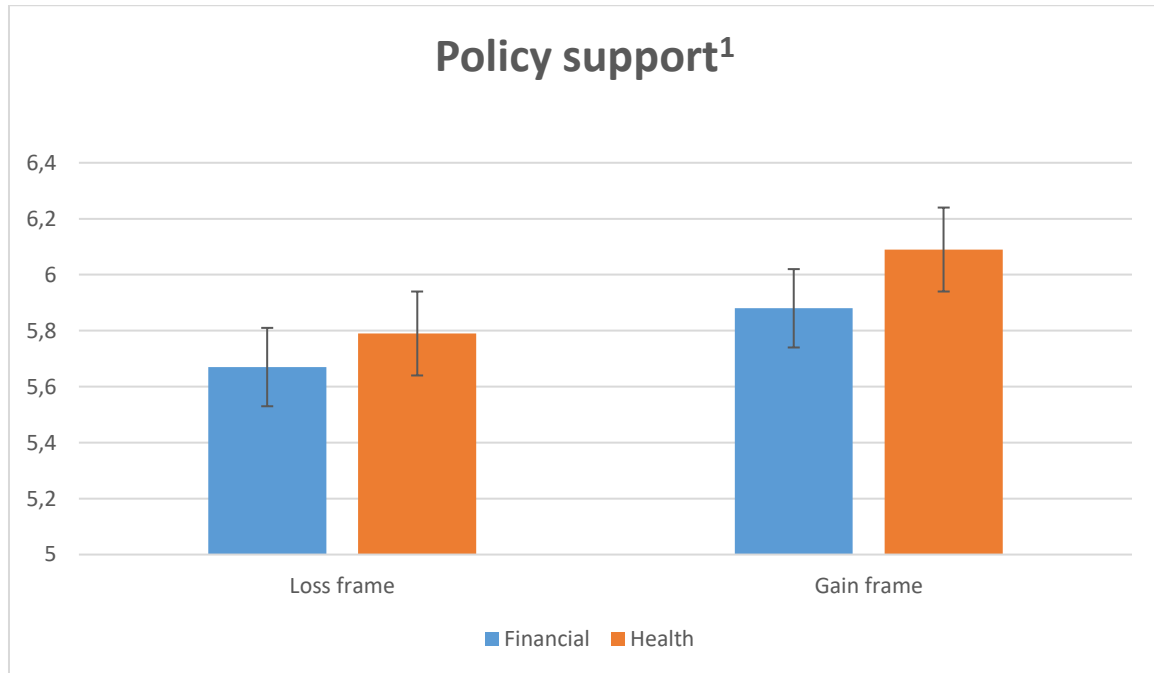
*Table 9 – Results of factorial ANOVA for hypothesis four.*

|  | Loss frame (N=83) | Gain frame (N=88) |
|---|---|---|
| **Financial topic (SE) (N=89)** | 5,67 (0,14) | 5,88 (0,14) |
| **Health topic (SE) (N=82)** | 5,79 (0,15) | 6,09 (0,14) |

*Dependent variable: support on a scale of 1 (minimum) to 7 (maximum).*
*Interaction effect of health/finance vs gain/loss is not significant.*

*Figure five: Policy support distribution over frames and topics.*



*1: Policy support on a scale of 1 (minimum) to 7 (maximum).*

**H5:** *Relative egoistic people react positively to a gain or loss frame, while relative altruistic people react positively to the environmental frame.*

A factorial ANOVA shows that the distinction between relative egoistic and relative altruistic people is significant (p=0,001). Relative egoistic people show an average of 8,5% less support than relative altruistic people[16].

The effect of the frame is significant ($F_{(2,134)}=3,27$, 0,046 and $eta^2=0,047$). Although the frame is significant for the relative egoistic and altruistic together, dividing the sample into relative egoistic and altruistic shows that both groups do not significantly differ in support over the three frames.

This finding means that relative egoistic people do not have a significant reaction to a gain or loss frame (table ten). Furthermore, relative altruistic people also don't have a significant different reaction to the environmental frame compared to a loss or gain frame. The interaction effect between 'frame' and 'relative egoistic/altruistic people' is not significant. Hypothesis five is therefore disconfirmed.

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[16] Based on the average support of the overall sample: 5,9 on a scale of 1 (minimum) to 7 (maximum).

There is no evidence that the first part of $H_5$ in which relative egoistic people react better to a gain or loss frame, is correct. A possible reason for this is that this sample only contains two participants with high egoistic values; all other participants are relative egoistic, which means that they are less altruistic than other participants. Repeating this study with a sample of people with higher egoistic values may lead to different results.

It is important to note that, due to the tertile split, the analysis is performed with less data, which decreases the statistical power of the ANOCA test. The data does describe the second part of $H_5$, in which relative altruistic people react positive to an environmental frame. However, the effect is not significant. The second part of $H_5$ could possibly become significant with more data.

*Table 10 – Results of factorial ANOVA for hypothesis five.*

|  | Environmental frame (N=25) | Gain frame (N=53) | Loss frame (N=62) |
|---|---|---|---|
| **Relative altruistic (SE) (N=70)** | 6,51 (0,22)[a,b] | 6,28 (0,17)[a] | 6,01 (0,15)[a] |
| **Relative egoistic (SE) (N=70)** | 6,00 (0,27)[a,b] | 5,85 (0,16)[b] | 5,48 (0,15)[b] |

*Dependent variable: support on a scale of 1 (minimum) to 7 (maximum).*
*The interaction effect is not significant.*

*Figure six: Policy support distribution over frames separated by personal values.*
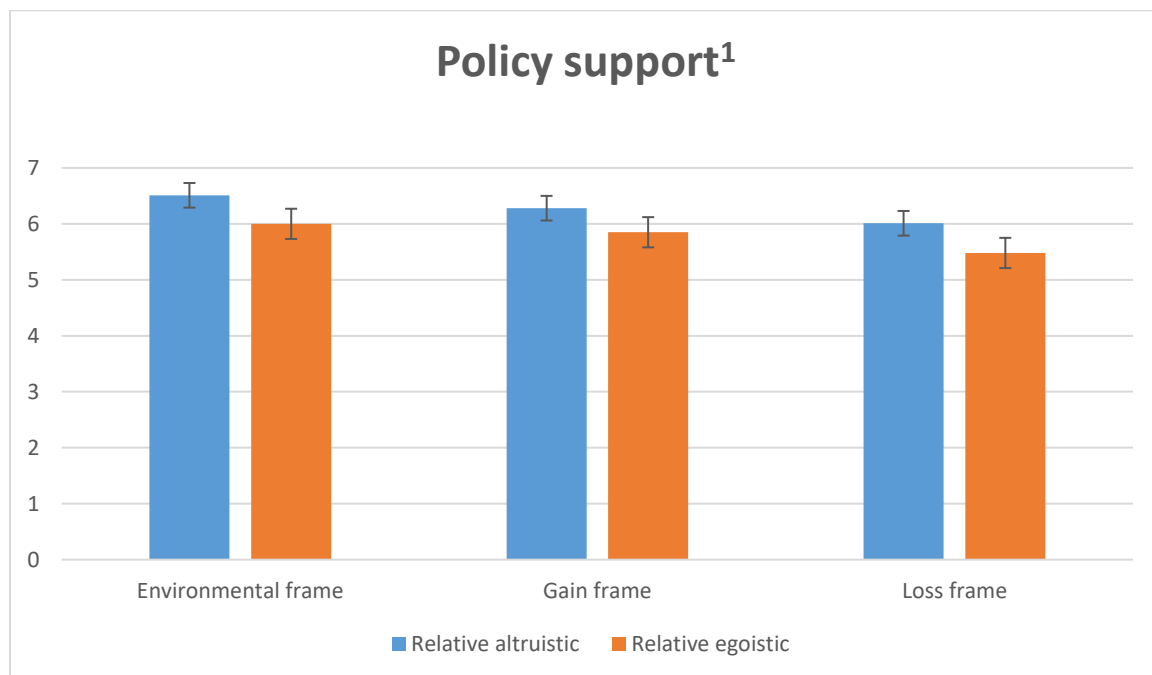


*1: Policy support on a scale of 1 (minimum) to 7 (maximum).*

# 5. Conclusion and Discussion

Support for climate change policies is essential to limit climate change. However, gathering policy support has been one of the greatest struggles in the environmental movement (Dietz et al., 2007). The success of the environmental frame to gather support for climate change policies has stalled and policy support has stagnated (Bain et al., 2015). The environmental frame is especially unsuccessful in gathering policy support of people who are critical towards climate change.

A new method by Bain et al. (2015) could be a solution to the stagnation of policy support. By using a gain frame, which frames policy information in terms of personal benefits (co-benefits), Bain et al. (2015) state that both critics and non-critics are motivated to act against climate change. If a gain frame is indeed effective for both climate change critics and non-critics, the use of a gain frame could be a solution to the stagnated support for climate change policies. This could have far reaching consequences for the way we communicate about climate change. Especially for organisations and governments seeking to increase support for climate change polices.

In addition to the effect of a gain frame, several studies suggest that negative information has a stronger psychological effect than positive information (Baumeister et al., 2001). Therefore, the use of a loss frame, which highlights personal costs of climate change, may have a stronger effect on policy support. Bain et al. (2015) have not taken this into account in their study.

In this study, I have examined the effect of a gain and loss frame on policy support of non-critics. By focusing on non-critics, I have tested the external validity of the theory of Bain et al. (2015), who state that a gain frame is effective for both critics and non-critics. That focussing on personal costs and benefits, instead of environmental costs and benefits, is effective for climate change critics is somewhat logical. However, that focussing on personal costs and benefits is effective for people who are concerned about the environmental costs and benefits seems less obvious. Therefore, it is important to verify this finding and to test the external validity of the findings of Bain et al. (2015).

The study shows interesting and mixed results which lead to the rejection of four of the five hypotheses. Nevertheless, the results have important theoretical and practical implications.

With respect to the effect of frames on policy support, compared to the use of the environmental frame, the use of a gain or loss frame reduces policy support of non-critics. This means that the environmental frame works best in gathering support for climate change policies of non-critics. Furthermore, contrary to Bain et al. (2015), this study finds no differences between the effect of a health or financial topic in the frames.

A major theoretical implication of this study is that the loss frame has a negative effect on policy support of non-critics. This contributes to the literature, as the direction of the relationship of a loss frame on climate change policy support was not clear. Furthermore, this finding confirms the existence of a negativity bias, as the loss frame has a stronger (negative) effect than the gain frame.

An overarching explanation for these findings can be found in the theory of framing: to be effective in reaching its goal, a frame needs to correlate with the belief system of the audience (Dietz et al., 2007). In this case, the goal of the frame is to gather policy support. However, Bain et al. (2015) have suggested that one frame, the gain frame, is effective for both two-belief systems: climate change critics and non-critics. This study disconfirms this finding: one frame does not fit all. I find that a frame can even decrease support when the frame does not fit the belief system of the audience. Non-critics are generally concerned about environmental consequences of climate change. Shifting the focus to personal costs and benefits goes against their belief system and decreases their support.

Another important theoretical implication is that, if a frame does not fit the audience, the topic of the frame does not play a role. When personal costs and benefits are highlighted while the audience is concerned about environmental costs and benefits, the nature of the personal costs and benefits is insignificant. It does not matter if the personal costs are financial or health related, the fact that the costs and benefits are of a personal nature and not of an environmental nature is what causes the mismatch between the frame and the audience of non-critics. This finding extends the theory of framing.

The question that remains is why Bain et al. (2015) have found that one frame, the gain frame, is successful for both critics and non-critics. A possible explanation lies in the sample. Bain et al. (2015) have used a sample of students. Students are, generally speaking, in a lower economic position than working adults[17]. The majority of the sample used for this study is made up out of people with a higher economic position. It could be possible that, in lower economic positions, financial incentives are stronger than one's belief system regarding climate change. This could also be the reason that Bain et al. (2015) find that financial benefits are the most effective.

The final theoretical implication is that I find that relative egoistic people show significant less support than relative altruistic people. However, I find no evidence that people with relative high egoistic values react better to a gain or loss frame or that people with relative high altruistic values react better to the environmental frame. A possible explanation for this finding can lie in the use of a sample with mostly people with high altruistic values. Further research with a sample of people with high egoistic values is needed to confirm this finding that personal values do not play a role in determining one's reaction to a frame.

This mentioned, this study is not without limitations. Firstly, the sample used in this study is not representative for the population of the Netherlands. The participants are relatively highly educated, politically left wing orientated, and show high levels of altruism, climate change belief and policy support.

Although the sample is not representative, it is useful for the purpose of this study. The homogeneity of the sample is useful to identify the effect of framing on policy support. The disadvantage of this sample is that I cannot draw conclusions about the effect of framing on climate change critics. Further research could repeat this study with a sample of climate change critics. This would provide information on the effect of frames on critics.

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[17] The average income class of the sample is between the €25.000 and €50.000 annually.

Secondly, this study is conducted by focussing on the climate change policy of subsidizing solar energy. Other climate change policies have other co-benefits and co-costs. For example, recently the plan to plant more forest in the Netherlands has been proposed[18]. Co-benefits here are related to cleaner air and more recreation area for walking, playing, and picnics. The nature of the policy presented in the frame and the attached co-benefits and co-costs could potentially influence the support for the policy. Therefore, future research could compare different policies and look at the effect of this on policy support.

Finally, this study is conducted in the context of the Netherlands. It is possible that culture, local media, and education system play a role in the results. For example, the debate about climate change is much less polarized in the Netherlands as it is in a country like the United States (McCright and Dunlap, 2011). Furthermore, there are countries with a much higher climate risk index than the Netherland. Citizens of countries with a low climate risk index, such as the Netherlands, may have a different reaction to frames than countries such as Pakistan and Guatemala. These countries have a high climate risk index and suffer from floods and extreme weather (Hellmuth et al., 2009). Due to the fact that the consequences of climate change are much more apparent in these countries, bringing the benefits and costs up close and personal with co-benefits and co-costs, may be less effective.

Even when these limitations are considered, the results of this study form an important lesson for the government. The main lesson that can be learnt is that gain and loss frames are not the ultimate solution to the problem of stagnated policy support. This study shows that, even if the gain and loss frame are effective for climate change critics, the increase of policy support in critics will be, at least partly, compensated by a decrease in support of non-critics. This leads to a dilemma for the government: the environmental frame fails to gather support for critics, while a gain and loss frame fails to gather support for non-critics.

To respond to this dilemma, I suggest looking into two options. Firstly, it could be effective to alter the frame depending on someone's belief in climate change. This would mean working with several frames. The media already does this by adjusting the context of a story to the viewpoints and belief system of their audience (Hulme, 2009). Further research is needed to determine the desirability of the use of multiple frames by the government and to determine how the government could best implement the use of these multiple frames. An example could be by asking a person a few questions on the government website to determine the appropriate frame for this person. After determining the appropriate frame, the government could show the requested information on a policy.

The second option to respond to the dilemma, would be to combine elements of both frames. For example, to present both environmental benefits and personal benefits. According to Bain et al. (2015), these benefits should be complementary to each other. However, there are some signs that the positive effect of personal benefits on critics is smaller than the negative some critics may have to the environmental benefits (Bain et al., 2015).

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[18] Veen, C. van der (2016), '100.000 hectare nieuw bos in Nederland', NCR 24 okt. 2016, https://www.nrc.nl/nieuws/2016/10/24/100-000-hectare-nieuw-bos-in-nederland-a1528100.

Although there are several options for further research, I strongly suggest that further research focusses on above two options to determine an effective frame to communicate on climate change policies and to gather support of both critics and non-critics. Several scientists state that many of the consequences of climate change are already irreversible (Lavieren, 2013: 9). To prevent further negative consequences of climate change, it important to implement climate change policies. Gathering support for these policies are crucial element of their success. To limit climate change, governments need all the support they can get.

Finally, the debate surrounding the use of frames in the arena of climate change related topics, such as gathering support for climate change policies and motivating people to act environmentally friendly, is fairly new. The literature on the use of frames to gather support for climate change policies is still in its infancy[19]. The statement of Bain et al. (2015) that a gain frame is effective for both critics and non-critics, is an important finding but also a rather strong implication. This study contributes to the debate by studying the effect of alternative frames and by applying important boundaries to the theory of Bain et al. (2015). As this is such an important but rather new study area, I expect that many more contributions to this area of study will follow and that the debate on the use of frames to gather support for climate change policies will expand.

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[19] Bain et al. published their theory about co-benefits in relationship to environmentally friendly behaviour in 2015. Van Dam published his findings on the effect of negative frames on consumption of environmentally friendly products in 2016.

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# 7. Appendix A – The text on the websites

The text on the websites is in Dutch and is based upon the actual texts on the website of the Dutch government. The website design mimics the Dutch government website. Below are the translations of the used texts. There are five different websites. All websites contain a section of neutral information on the climate change policy of subsidizing solar power. The texts on these websites are as identical as possible. The co-benefits and co-costs are mirrors of each other and focus on health and financial costs and benefits. The texts are altered exclusively on critical aspects concerning the presentation of the co-benefits and co-costs. These parts are highlighted in bold (this is not visible for the participants). Oblique text is used to highlight important information to make them more apparent to the participants. All websites contain between 100 and 116 words.

<u>Website one</u> - Solar energy is produced by transferring sunlight into electricity by using solar panels.

Solar panels can be placed on land and roofs of houses and firms. The Dutch government supports the use of solar energy by offering tax rebates and low interests loans for citizens or firms interested in purchasing solar panels.

Implementing the policy of subsidizing solar energy has *environmental benefits.*

The use of solar energy instead of fossil fuel leads to a strong decrease in $CO_2$ emission. Because of this, the greenhouse effect, which causes global warming, decreases. The use of solar energy is therefore *good for the environment.*

*Table 11 – Overview of the frames on the websites.*

|                  | Gain frame  | Loss frame  |
|------------------|-------------|-------------|
| Financial topic  | Website 2   | Website 3   |
| Health topic     | Website 4   | Website 5   |

*Table 12 – Text on websites two and three.*

| Website 2: Financial gain frame | Website 3: Financial loss frame |
|---|---|
| Solar Energy<br><br>Solar energy is produced by transferring sunlight into electricity by using solar panels. Solar panels can be placed on land and roofs of houses and firms. The Dutch government supports the use of solar energy by offering tax rebates and low interests loans for citizens or firms interested in purchasing solar panels. | Solar Energy<br><br>Solar energy is produced by transferring sunlight into electricity by using solar panels. Solar panels can be placed on land and roofs of houses and firms. The Dutch government supports the use of solar energy by offering tax rebates and low interests loans for citizens or firms interested in purchasing solar panels. |
| **Implementing** the policy of subsidizing solar energy has *financial benefits*.<br><br>**By using** solar energy, the cost of electricity **decreases**. **By using private solar panels, you produce your own electricity, which means you have to buy less electricity.** Consequently, your *electricity bill will be **cheaper***. | **Not implementing** the policy of subsidizing solar energy has *financial cost*<br><br>**By not using** solar energy, the cost of electricity **stays relative high. You will need to buy all of your electricity from an electricity firm**. Consequently, your *electricity bill will be **more expensive***. |

*Table 13 – Text on websites four and five.*

| Website 4: Health gain frame | Website 5: Health loss frame |
|---|---|
| Solar Energy<br><br>Solar energy is produced by transferring sunlight into electricity by using solar panels. Solar panels can be placed on land and roofs of houses and firms. The Dutch government supports the use of solar energy by offering tax rebates and low interests loans for citizens or firms interested in purchasing solar panels. | Solar Energy<br><br>Solar energy is produced by transferring sunlight into electricity by using solar panels. Solar panels can be placed on land and roofs of houses and firms. The Dutch government supports the use of solar energy by offering tax rebates and low interests loans for citizens or firms interested in purchasing solar panels. |
| **Implementing** the policy of subsidizing solar energy has *health benefits*.<br><br>**The use of** solar energy instead of fossil fuel **creates *cleaner air* with less** particulate matter. Particulate matter can cause headaches, dizziness, nausea, and asthma symptoms**. A cleaner air with less particulate matter decreases** these health complaints. **The use of solar energy is therefore *good for your health*.** | **Not implementing** the policy of subsidizing solar energy has *health costs*.<br><br>**Without the use of** solar energy instead of fossil fuel, **the *air stays polluted* with** particulate matter. Particulate matter can cause headaches, dizziness, nausea, and asthma symptoms. **Polluted air with a lot of particulate matter increases** these health complaints. **Not using solar energy is therefore *bad for your health*.** |

As mentioned earlier the websites are designed to mimic the website of the Dutch government. Below are the five websites as they have been shown to the participants.

*Figure seven - website one: The environmental frame.*



*Figure eight - website two: The financial gain frame.*

*Figure nine - website three: The financial loss frame.*



*Figure ten - website four: The health gain frame.*

*Figure eleven - website five: The health loss frame.*



Rijksoverheid

Home   Actueel   **Onderwerpen**   Ministeries   Regering   Documenten   Doe mee                    Q Zoek

Home  ›  Alle onderwerpen  ›  Duurzame energie  ›  Inhoud

## Duurzame energie

Overzicht   **Inhoud**   Nieuws   Vraag en antwoord   Documenten

### Zonne-energie

Bij zonne-energie wordt zonlicht omgezet in elektriciteit via zonnepanelen. Deze zonnepanelen kunnen op het land en op daken van huizen en bedrijven worden geplaatst. De Nederlandse overheid stimuleert het gebruik van zonne-energie door het gebruik van zonnepanelen te subsidiëren. Hierbij biedt de overheid belastingkortingen en lage leningen voor burgers of bedrijven die zelf zonnepanelen aanschaffen.

Het *niet* in werking stellen van het beleid om zonne-energie te subsidiëren heeft *gezondheidsnadelen*.

Zonder het gebruik van zonne-energie in plaats van fossiele brandstoffen, blijft *de lucht vervuild* met fijnstof. Fijnstof kan zorgen voor hoofdpijn, duizeligheid, misselijkheid en astmaklachten. Een vervuilde lucht met veel fijnstof versterkt deze klachten. Het niet gebruiken van zonne-energie is daarom *slecht voor uw gezondheid*.

## 8. Appendix B – Questionnaire Items

***Items for climate change policy support – subsidizing solar energy***

| | |
|---|---|
| | **Background items** |
| **1** | Do you own solar panels? This can be for both private and professional use. *(yes/no)* |
| **2** | What is your gender? *(male/female)* |
| **3** | What is your year of birth? *(year)* |
| **4** | What is your annual gross income? This is your own income; this income could be from a pension, allowance, or salary. The answers to this question are only used on an aggregated level. *(Less than 25.000, 25.000 to 50.000, 50.000 tot75.000, 75.000 to 100.000, 100.000 to 125.000, More than 125.000, No answer)* |
| | **Pre-knowledge and beliefs (Cronbach's α = 0,875). Answers range from 1 (min) to 7(max).** |
| **1** | I am well aware of the government's policy to subsidize solar energy. |
| **2** | The climate is changing. |
| **3** | Climate change is (partly) the result of human activities. |
| **4** | Climate change is a serious problem. |
| **5** | It is possible to limit climate change. |
| **6** | I am well aware of the debate around climate change. |
| **7** | How important do you think climate change is? |
| | **Control items** |
| **1** | Time on website *(automatically tracked in seconds).* |
| **2** | Do not answer this question. This question is meant to filter out random answers. |
| **3** | Time on questionnaire *(automatically tracked in seconds).* |
| | **Manipulation check** |
| **1** | The website described the following in particular: *(website 1,2,3,4,5 or none of the above)* |
| | **Policy Support Items. Based on the reliability analysis, items 1,2 and 4 are combined into one measure for policy support. (Cronbach's α = 0,837). Answers range from 1 (min) to 7(max).** |
| **1** | I support the policy to subsidize solar energy. |
| **2** | I hope the policy of subsidizing solar energy continues in the future. |
| **3** | Subsidizing solar energy is a task for the government. |
| **4** | I <u>cannot</u> accept the policy to subsidize solar energy. |
| **5** | I got used to the policy of subsidizing solar energy. |
| **6** | My acceptance of the policy to subsidize solar energy has increased over the past years. |
| **7** | I will protest against the policy of subsidizing solar energy. |
| | **Personal Values Items. The average of altruistic1,2,3 is used to determine relative altruists and egoists using a tertile split (Cronbach's α = 0,652). Answers range from 1 (min) to 7(max).** |
| **Altruistic** | |
| **1** | I think it is important to live in harmony with animals. |
| **2** | I think it is important that everyone has equal chances. |
| **3** | I think it is important to fight against climate pollution. |
| **4** | I think it is important to help weaker people. |

| | |
|---|---|
| **Egoistic** | |
| **1** | I think it is important that people look up to me. |
| **2** | I think it is important to have an influential role. |
| **3** | I think material possessions are important. |
| **Political Preference** | On which political party did you vote last elections? |
| | Trust in Government Items. Cronbach's α = 0,709. Answers range from 1 (min) to 7(max). |
| **1** | The information from the government about the policy of subsidizing solar energy is reliable. |
| **2** | The government has the capacity to implement the policy of subsidizing solar energy successfully. |
| **3** | The government acts in the best interest of citizens. |

# 9.  Appendix C – Robustness analysis

## 9.1 Analysis

A regression analysis shows that, out of al control variables, only the variable 'trust in government' is significant (see table 14)[20].

*Table 14– Results of regression on climate change policy support*

| Independent variables | Standardized coefficients (Beta) |
|---|---|
| **Age (SE)** | 0,19 |
| **Gender (SE)** | -0,12 |
| **Own private solar panels (SE)** | 0,10 |
| **Income (SE)** | -1,23 |
| **Moderate left wing orientated (SE)** | -0,02 |
| **Trust in government (SE)** | 0,25** |

*Dependent variable: policy support.*
*F(6,106)=2,068, p=0,0,63, $R^2$adjusted=0,105.*
*Entries are standardized regression coefficients.*
*\* significant at 0,05; \*\* significant at 0,01; \*\*\* significant at 0,001.*

An ANCOVA of the average policy support shows that trust in government is the only significant covariate. The frame significantly influences policy support ($F_{(4,102)}$=3,987, p=0,005, $eta^2$ = 0,135). When we compare these results to table five in the result section, we see that the environmental frame still gathers the most policy support and the financial loss frame the least.

*Table 15 – results of ANCOVA - Average policy support with control variables*

| | Environmental frame | Financial gain frame | Financial loss frame | Health gain frame | Health loss frame |
|---|---|---|---|---|---|
| **N** | 23 | 19 | 23 | 23 | 25 |
| **Average policy support (SE)[1]** | 6,4 (0,22)[a] | 5,7 (0,24)[b] | 5,4 (0,22)[b] | 6,3 (0,22)[a] | 5,6 (0,21)[b] |

*1:  On a scale of 1 (minimum) to 7 (maximum).*
*Covariates: trust in government (p=0,021), gender, income, age, political orientation, own private solar panels.*

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[20] Policy support and trust in government cannot replace each other as dependent variable as these show very different results. For example, when policy support is the dependent variable, the use of a frame is significant (0,017), but when 'trust in government' is the dependent variable, the use of a frame does not significant influence policy support (p=0,133). Furthermore, the distributions of policy support changes. For example, when 'trust in government' is the dependent variable, the environmental frame and financial gain frame have similar levels of policy support (5,2 (0,9) vs 5,1 (0,8)). This is not the case with policy support as dependent variable (see table 14). The correlation between 'policy support' and 'trust in government' is 0,250 (p=0,000) based on Spearman's rho.

*Figure twelve – Average policy support*
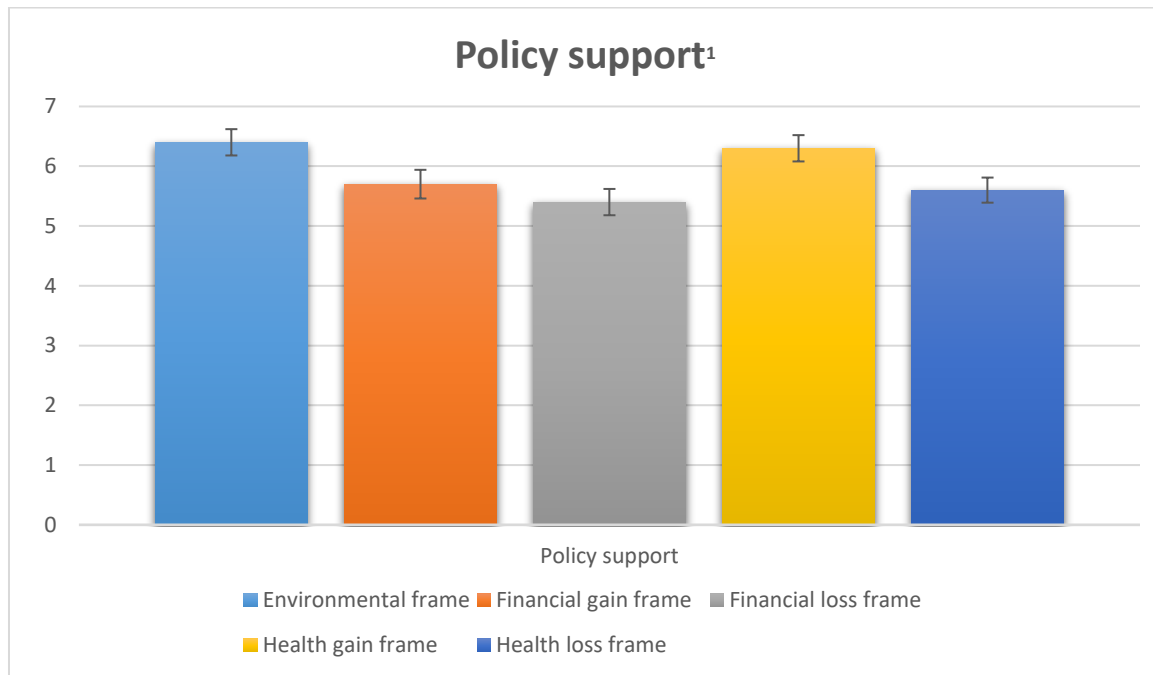


*1: Policy support on a scale of 1 (minimum) to 7 (maximum).*

The results of each hypothesis with control variables will be discussed separately.

**H₁:** *Framing information about climate change policy by using a gain or loss frame results into more policy support compared to the environmental frame.*

The robustness analysis shows the same results as in the result section (without covariates). With 'trust in government' as covariate, there is still a significant difference between support in the environmental frame and the alternative frames ($F(1,208)=6,09$ $p=0,014$, $eta^2=0,028$).

Contrary to the expectation, policy support decreases with the use of an alternative frame by an average of 6,8%[21]. Therefore, the hypothesis is disconfirmed.

Table 16 shows the ANCOVA results with 'trust in government' as covariate. Table 17 shows the ANCOVA results with all control variables as covariates ($F(1,105)=6,18$, $p=0,014$, $eta^2=0,056$).

*Table 16 – Results of ANCOVA for hypothesis one with 'trust in government'.*

|  | Environmental frame (N=40) | Alternative frame (N=171) | Difference |
|---|---|---|---|
| **Policy support (SE)[1]** | 6,27 (0,15)[a] | 5,87 (0,07)[b] | -0,404 (0,16) |

*1: On a scale of 1 (minimum) to 7 (maximum).*
*Covariates: trust in government (p=0,004).*

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[21] Based on the average support of the overall sample: 5,9 on a scale of 1 (minimum) to 7 (maximum).

*Table 17 – Results of ANCOVA for hypothesis one with all control variables.*

|  | Environmental frame (N=23) | Alternative frame (N=90) | Difference |
|---|---|---|---|
| **Policy support (SE)[1]** | 6,38 (0,23)[a] | 5,76 (0,11)[b] | -0,624 (0,25) |

*1:  On a scale of 1 (minimum) to 7 (maximum).*
*Covariates: trust in government (p=0,017), gender, income, age, political orientation, own private solar panels.*

**H$_2$:** *The loss frame has a stronger (positive or negative) effect on policy support than the gain frame.*

The robustness analysis shows the same results as in the result section (without covariates). There is no significant difference in support between the gain and the loss frame, but comparing both with the environmental frame, the loss frames gathers significant less support.

With 'trust in government' as covariate, table 18 shows that the loss frame gathers 9% less average support than the environmental frame (F(2,107)=4,12 p=0,018, eta$^2$=0,038)[22].

An ANCOVA in table 19 with all control variables shows the same result (F(2,107)=4,12 p=0,018, eta$^2$=0,038). This means that the hypothesis is confirmed; the loss frame indeed has a stronger effect on policy support than the gain frame. The effect of the loss frame is negative.

*Table 18 – Results of ANCOVA for hypothesis two including 'trust in government'.*

|  | Environmental frame (N=40) | Loss frame (N=83) | Gain frame (N=88) |
|---|---|---|---|
| **Policy support (SE)[1]** | 6,27 (0,15)[a] | 5,76 (0,10)[b] | 5,97 (0,10)[a,b] |

*a: differs significantly with p=0,005 and a difference of -0,515 (0,18).*
*Covariates: trust in government (p=0,008).*

*Table 19 – Results of ANCOVA for hypothesis two including all control variables.*

|  | Environmental frame (N=23) | Loss frame (N=48) | Gain frame (N=42) |
|---|---|---|---|
| **Policy support (SE)[1]** | 6,39 (0,15)[a] | 5,50 (0,15)[b] | 6,05 (0,16)[a,b] |

*a: differs significantly with p=0,001 and a difference of -0,890 (0,27)*
*Covariates: trust in government (p=0,032), gender, income, age, political orientation, own private solar panels.*

---

[22] Based on the average support of the overall sample: 5,9 on a scale of 1 (minimum) to 7 (maximum).

**H₃:** *The financial topic has a stronger positive effect on policy support than the health topic.*

The analysis with the covariates shows the same results as in the result section. The financial topic gathers least support. The effect between the financial and environmental is significant (see table 20 and 21).

There is no significant effect between the health and the environmental topic or between the health and financial topic. Therefore, hypothesis three is disconfirmed.

*Table 20 – Results of ANOVA for Hypothesis three including 'trust in government'.*

|  | Environmental topic (N=40) | Financial topic (N=89) | Health topic (N=82) |
|---|---|---|---|
| **Policy support (SE)[1]** | 6,27 (0,15)[a] | 5,78 (0,10)[b] | 5,96 (0,10)[a,b] |

1: On a scale of 1 (minimum) to 7 (maximum).
Trust in government (p=0,004).
$F_{(2,207)}=3,765$, p=0,025, $eta^2=0,035$.
The difference between the environmental and financial topic is significant (p=0,007).

*Table 21 – Results of ANOVA for Hypothesis three including all control variables.*

|  | Environmental topic (N=23) | Financial topic (N=42) | Health topic (N=48) |
|---|---|---|---|
| **Policy support (SE)[1]** | 6,39 (0,22)[a] | 5,59 (0,17)[b] | 5,91 (0,16)[a,b] |

1: On a scale of 1 (minimum) to 7 (maximum).
Covariates: trust in government (p=0,08), gender, income, age, political orientation, own private solar panels.
$F_{(2,105)}=4,062$, p=0,020, $eta^2=0,072$.
The difference between the environmental and financial topic is significant (p=0,005).

**H₄:** *The effect of varying between a gain or loss frame is stronger than the effect of varying between a health and a financial topic.*

The factorial ANOVA analysis with covariates shows the same results as the result section. There is no significant difference between the gain and loss frames and between the health and financial topics. Therefore, the hypothesis is disconfirmed. We do find the same patterns where the health gain frame gathers most support and the financial loss frame gathers least (see table 22).

*Table 22 – Results of factorial ANCOVA for hypothesis four including 'trust in government'.*

|  | Loss frame (N=83) | Gain frame (N=88) |
|---|---|---|
| **Financial topic (SE) (N=89)** | 5,71 (0,15) | 5,85 (0,15) |
| **Health topic (SE) (N=82)** | 5,80 (0,16) | 6,07 (0,15) |

Dependent variable: support on a scale of 1 (minimum) to 7 (maximum).
Covariate: trust in government (p=0,014).
Interaction effect is not significant.
$F_{(1,166)}=1,13$, p=0,289, $eta^2=0,007$.

*Table 23 – Results of factorial ANCOVA for hypothesis four including all control variables.*

|  | Loss frame (N=48) | Gain frame (N=42) |
|---|---|---|
| **Financial topic (SE) (N=42)** | 5,39 (0,24) | 5,74 (0,26) |
| **Health topic (SE) (N=48)** | 5,59 (0,23) | 6,35 (0,24) |

*Dependent variable: support on a scale of 1 (minimum) to 7 (maximum).*
*Covariates (none are significant): trust in government gender, income, age, political orientation, own private solar panels.*
*Interaction effect is not significant (p=0,389).*
*$F(1,80)=2,59$, p=0,111, $eta^2=0,031$.*

**H$_5$:** *Relative egoistic people react positively to a gain or loss frame, while relative altruistic people react positively to the environmental frame.*

Repeating the analysis with the covariate 'trust in the government' shows that this covariate is not significant. Including this means that the frame is no longer significant (p=0,073), but the distinction between relative egoistic and altruistic is (p=0,003). Furthermore, the interaction effect remains insignificant ($F(2,133)=2,238$, p=0,111, $eta^2=0,033$). This analysis shows the same results as in the result section where H$_5$ is disconfirmed (table 24).

Including all other control variables further decreases significance, but the results remain the same (table 25): H$_5$ is disconfirmed.

*Table 24 – Results of factorial ANOVA for hypothesis five including 'trust in government'.*

|  | Environmental frame (N=25) | Gain frame (N=53) | Loss frame (N=62) |
|---|---|---|---|
| **Relative Altruistic (SE) (N=70)** | 6,48 (0,21) | 6,24 (0,17)[a] | 6,13 (0,15)[b] |
| **Relative Egoistic (SE) (N=70)** | 5,97 (0,26) | 5,84 (0,16)[a,] | 5,51 (0,15)[b] |

*a: Significant difference of p=0,006 ($F(1,50)=8,094$, $eta^2=0,139$).*
*b: Significant difference at p=0,028 ($F(1,59)=5,106$, $eta^2=0,080$).*
*Dependent variable: support on a scale of 1 (minimum) to 7 (maximum).*
*Covariate: trust in government (not significant).*
*The interaction effect is not significant.*

*Table 24 – Results of factorial ANOVA for hypothesis five.*

|  | Environmental frame (N=14) | Gain frame (N=25) | Loss frame (N=34) |
|---|---|---|---|
| **Relative altruistic (SE) (N=35)** | 6,84 (0,34) | 6,43 (0,27) | 5,95 (0,27) |
| **Relative egoistic (SE) (N=38)** | 6,22 (0,43) | 5,92(0,29) | 5,35 (0,21) |

*Dependent variable: support on a scale of 1 (minimum) to 7 (maximum).*

*Covariates (none are significant): trust in government gender, income, age, political orientation, own private solar panels.*

*The interaction effect is not significant.*