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Unequal means more unfair means more negative emotions? Ethical concerns and emotions about an unequal distribution of negative outcomes of a local energy project

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ABSTRACT

Emotions may play an important role in how citizens respond to public policies, and energy policies in particular. Yet, little insights exist into causes of those emotions. This study investigates ethical concerns as the basis of emotions. We test whether people perceive an *unequal* distribution of negative outcomes of a local energy project as more unfair than an equal distribution thereof and, in turn, experience stronger negative emotions (hypothesis 1) and whether these effects depend on whether the project has personal consequences or not (i.e. the self-relevance of the project; hypothesis 2). In an experiment with a 2 (equal vs. unequal distribution) by 2 (self-relevant vs. not self-relevant) design ($N = 282$), we find support for hypothesis 1, but not 2. Furthermore, we find that perceived total amount of harm, an ethical concern about the total amount of negative outcomes bestowed on all people together, is also (marginally significantly) affected by the unequal distribution and relates to the emotions. We argue that justified ethical concerns are at the root of emotions about renewable energy projects and therefore emotions and their underlying ethical concerns should be considered for socially responsible as well as successful energy policy making.

1. Introduction

New public policies often encounter public resistance. Initial evidence indicates that particularly when resistance is fueled by strong negative emotions, the risk exists that a policy is not implemented (Contzen et al., 2021a; Rodriguez-Sanchez et al., 2018). Emotional resistance has also taken place against new energy policies and projects, such as on nuclear energy and waste siting (e.g. Bourassa et al., 2016), carbon capture and storage (e.g. Feenstra et al., 2010) and wind energy (Cass and Walker, 2009). Policy makers tend to see these emotional responses by citizens as irrational, random nuisance to avoid (Cass and Walker, 2009), leading policy makers to either ignore emotions or follow them blindly (cf. Perlaviciute et al., 2018). Recently, it has been argued, however, that emotions towards both new energy policies and specific energy projects may have a systematic base and these emotions and their underlying causes should therefore be more constructively responded to by policy makers (Contzen et al., 2021b; Huijts, 2018; Perlaviciute et al., 2018; Roeser, 2006).

One particularly relevant base of emotional responses to energy policies, and specific energy projects, might be ethical[1] concerns, such as a project's fairness[2] or potential negative outcomes for people living near to a project. Indeed, philosophers have developed theories of

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[1] We use the notions 'ethical' and 'moral' interchangeably in what follows.

[2] We use the term fairness for citizens' justice judgments, to reflect the terminology that citizens are likely to use, and that is commonly used in psychology (Gross, 2007; Huijts et al., 2012). We use the term justice to reflect the rightness of how people are treated from a normative point of view, reflecting terminology commonly used in philosophy (Miller, 2017).

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emotions that argue for a link between moral judgments and emotions; more specifically, they have argued that such ethical concerns can give rise to *justified* emotional responses (Nussbaum, 2001; Roberts, 2003; Roeser, 2011; Roeser and Todd, 2014), also in the context of technological risks and energy policies (Roeser, 2018).

Particularly when ethical concerns are at the root of public emotions, it is valuable to gain an understanding into these concerns and take them into account in policy-making. More specifically, when these ethical concerns are normatively justifiable, based on ethical arguments that can be shared and understood by others, they should be taken into account in the policy making about energy projects to create a more *socially responsible* energy transition (Roeser, 2018). Furthermore, as emotions may play a role in whether people accept or reject energy projects and policies (e.g. Contzen et al., 2021a; Huijts et al., 2014; Perlaviciute et al., 2018), understanding ethical underpinnings of emotions is also valuable from an instrumental point of view, because taking ethical concerns into account may help to avoid costly delays or even cancelation of projects due to emotional resistance.

Little experimental evidence exists, however, about the causes of emotions towards energy policies and specific projects, and about *ethical* underpinnings in particular. This paper therefore experimentally investigates the effect of (a) distributive justice,[3] which relates to deontological considerations in ethics (Kant, 1786), and (b) total amount of harm,[4] which relates to utilitarian considerations in ethics (Bentham, 1789). More specifically, rather than applying the theories of deontology and utilitarianism as such, we take deontological and utilitarian considerations as features that may play out in different ways in different contexts (so called 'context-sensitivity'), such as argued for by ethical intuitionists (Ross, 1930) and particularists (Dancy, 2004). Furthermore, we study these with the theoretical lens of 'affectual intuitionism', which holds that ethical intuitions are typically moral emotions that can provide us with insights into context-sensitive ethical considerations, such as deontological and utilitarian considerations (Roeser, 2011).

Specifically, we experimentally study the effect of these ethical underpinnings of emotions by manipulating the distribution of negative outcomes of a local renewable energy project, such as risks and nuisances, to be unequal versus equal, and test how this affects perceived distributive fairness, perceived total amount of harm, and in turn emotions. We use geothermal energy as a case, as this is a new energy source that could play an important role in future low-carbon energy systems but which also comes with risks and nuisance, and consequentially ethical concerns about distributive fairness and total amount of harm. To the best of our knowledge, neither perceived distributive fairness nor perceived total amount of harm have been empirically researched as sources of emotions in the context of energy policies and projects. Specifically, no *experimental* evidence exists into how people respond to different distributions of negative outcomes of energy projects and ethical concerns and emotions that are raised by that. Therefore, this study significantly contributes to the literature.

In the following section, we discuss the relevant literature from social psychology and philosophy. We will develop hypotheses about emotions and underlying ethical concerns in response to (un)equal distributions of negative outcomes, and assess, based on the mentioned ethical considerations and theories of moral emotions (Nussbaum, 2001; Roberts, 2003; Roeser, 2011, 2018; Roeser and Todd, 2014), whether the emotions and underlying ethical concerns are morally justifiable.

[3] "Distributive justice examines people's views about what is a fair outcome or distribution of resources" (p.118; Tyler, 2000); also cf. Rawls (1971) who developed a seminal theory of justice as fairness.

[4] I.e., the total amount of negative outcomes bestowed on all people together, such as the total amount of "physical and mental damage" (https://www.merriam-webster.com/dictionary/harm) that a population undergoes.

2. Theoretical background and current study

2.1. Unequal distribution of negative outcomes, perceived distributive unfairness, and emotions

The infrastructure of an energy project may be sited in a concentrated manner in one location only, such as a solar energy park at the outskirt of a city; or it may be distributed among the population, such as a city-wide roof-top solar energy project. Accordingly, the negative outcomes of an energy project may also be concentrated, thus affecting the population unequally – namely primarily those people living closest by – or distributed among the population, thus affecting the population rather equally.

Although distributive justice is widely discussed in the literature on energy justice (e.g. Jenkins et al., 2016; McCauley et al., 2019; van Bommel and Höffken, 2021) and public acceptance of energy technologies (e.g. Huijts et al., 2012; Perlaviciute and Steg, 2014), there is no experimental evidence available on public perceptions of and emotional responses to unequal versus equal distributions of negative (or positive) outcomes[5] of energy projects. However, evidence from other fields suggests that events with an unequal distribution of negative outcomes might cause negative emotions because people might perceive such a distribution as unfair. Specifically, there is experimental evidence to suggest that people perceive an unequal distribution of negative outcomes (e.g. the withholding of a financial reward or the loss of an enterprise) as more unfair and less preferable than an equal distribution thereof (Kayser and Lamm, 1980; Tornblom and Jonsson, 1985). Furthermore, people reported more negative emotions (called negative affect) towards unequally distributed financial rewards, which they perceived as more unfairly distributed (Van den Bos, 2001; Van den Bos et al., 2011). Additionally, correlational studies have shown that people experience more negative emotions when they perceive more unfairness in the context of energy projects (Dohle et al., 2012; Huijts, 2018; Huijts et al., 2014), or in life in general (Mikula et al., 1998; Scherer, 1997). In sum, based on the available empirical evidence, one could expect that people will perceive an unequal distribution of negative outcomes of an energy project as more unfair than an equal distribution and will thus experience more negative emotions towards such an energy project.

Research has shown that specific emotions lead to specific action tendencies. In the context of (technology induced) environmental risk, for example, Böhm and Pfister (2000) found that anger-related emotions predict aggression and retaliation tendencies, while fear-related emotions predict help and prevention tendencies. For energy projects, this might mean, for example, that people protest more violently against a project when they experience anger-rather than fear-related emotions. As different emotions may motivate different behaviors, it is important to understand the effect of the distribution of negative outcomes of energy projects, and of deontological considerations, on specific emotions, rather than overall positive or negative feelings only. We propose that in response to an unequal distribution of negative outcomes of energy projects and the related perceived distributed unfairness especially four emotions may occur. First, based on previous findings we assume that an unequal and thus unfair distribution of negative outcomes may evoke *anger-related emotions*, such as anger and indignation (Batson et al., 2007; Mikula et al., 1998; Pillutla and Murnighan, 1996; Scherer, 1997). Second, an unequal distribution of negative outcomes means that to some people a disproportionally large amount of negative outcomes may occur, which may be worrisome and cause fear (*fear-related emotions*). Third, in response to an unequal distribution of negative outcomes, people may feel *sympathy-related emotions* such as sympathy, pity and concern for those who are suffering disproportionally more than others (cf. Roeser, 2006). Fourth, people could feel positive emotions, such as joy and satisfaction (*joy-related emotions*), about a

[5] In this paper we focus on the distribution of negative outcomes only.

renewable energy project per se (Huijts, 2018). However, a more unequal distribution of negative outcomes of an energy project can potentially dampen these emotions, as it is more difficult to feel joy about a renewable energy project when some people are disproportionally negatively affected by it.

Yet, would these emotions be ethically justified? As we explain in more detail in the following, based on deontological considerations (Kant, 1786) and theories of emotions (cf. Nussbaum, 2001; Roberts, 2003; Roeser, 2018, 2011; Roeser and Todd, 2014), judging an unequal distribution of negative outcomes as unfair and responding with negative emotions to it is indeed normatively justifiable. Deontology is an ethical theory that focuses on the inherent rightness of an action, equality and respect for people. From a deontological point of view, people should in general be treated equally (Kant, 1786). There could be cases in which outcome inequalities can be morally justified, for example that people deserve more property for higher effort (a liberal idea going back to John Locke, 1689). However, from a deontological perspective it is problematic if some people undergo more negative outcomes of an energy project than others. According to affectual intuitionism, ethical concerns, such as deontological considerations and considerations of distributive justice, can be justifiable bases for emotional responses (Roeser, 2011), also in the context of decision making about technological innovations (Roeser, 2018). Hence, it would be justified to respond with more negative emotions to an unequal, and thus more unjust distribution of negative outcomes of an energy project than to an equal, and thus more just distribution of negative outcomes. Based on this approach, we can therefore conclude that 1) an equal distribution of an energy project's negative outcomes is more justified than an unequal distribution thereof and should thus be strived for, and 2) that negative emotions to an unequal, and thus more unfair, distribution of negative outcomes of an energy project are justified.

2.2. *Total amount of harm as another ethical concern mediating unequal distribution and emotions*

Based on the previous, one can assume that an unequal distribution of the negative outcomes of an energy project results in more negative emotions because such a distribution is perceived as more unfair than an equal distribution thereof. However, an unequal (as compared to an equal) distribution might also affect the (perceived) total amount of harm, which might also impact on emotions. Specifically, siting an energy project in a concentrated (and thus unequally distributed) manner in one location only might allow for a lower total amount of harm if (and only if) the location is more sparsely populated, and thus fewer people would be affected. An equal distribution of the technology and of the related negative outcomes among the population, however, would result in placing the technology in more and less densely populated areas alike, thus leading to the technology being closer to and affecting more people. An equal distribution of the negative outcomes of an energy project could thus cause a higher total amount of harm than an unequal distribution and – if also perceived as such – might cause more negative emotions in people.

To our knowledge, total amount of harm has not yet been considered in-depth in the energy justice literature (e.g. Jenkins et al., 2016; McCauley et al., 2019), although Sovacool and Dworkin (2015) refer to some utilitarian concerns. Moreover, the role of perceived total amount of harm has not yet been studied in the literature on public acceptance of energy technologies (e.g. Huijts et al., 2012; Perlaviciute and Steg, 2014) and to our knowledge, no study has yet experimentally investigated how people perceive the total amount of harm of different distributions of negative outcomes and whether and how this relates to emotions. However, studies in the context of environmental risks, including technological risks, show that stronger perceived negative consequences and threat to people in general are associated with more negative emotions, such as anger and fear (Böhm, 2003; Böhm and Pfister, 2000; Huijts, 2018). Based on the limited empirical evidence available, it could be assumed that *if* people perceive an equal (as compared to an unequal) distribution of negative outcomes of an energy project to result in a larger total amount of harm, they will, in turn, experience more negative emotions towards such an energy project, such as anger- and fear-related emotions.[6] Since the distribution of negative outcomes might impact on both perceived distributive unfairness and perceived total amount of harm, and as both perceived distributive unfairness and perceived total amount of harm may, in turn, be associated with emotions, we should consider perceived total amount of harm when studying the relation between unequal distribution of negative outcomes, perceived distributive unfairness, and emotions.

Yet, would emotions elicited by perceived total amount of harm be ethically justified? The utilitarian approach in ethics states that we should optimize the overall outcomes of a decision. This is not simply about optimizing the financial balance and thus the profit of a project, but concerns optimizing the balance of all goods and harm for all involved. Utilitarianism holds that one should choose the option that causes the best balance of outcomes (Bentham, 1789). Focusing on the negative outcomes of energy projects as we do in this paper, utilitarianism would argue to choose for the energy project that causes the least total amount of harm (i.e., the least risks and nuisance) for people. Based on utilitarianism, we can therefore conclude that *if* an *un*equal distribution of the negative outcomes of an energy project indeed causes a *lower* total amount of harm than an equal distribution, an *un*equal distribution is more justified than an equal distribution and should thus be strived for (cf. Hayenhjelm, 2012). It is worth mentioning that while deontology and utilitarianism are typically seen as rival ethical theories (and thus not applied at the same time), context-sensitive ethical theories emphasize that deontological and utilitarian considerations can both be potentially justified and need to be balanced per context (e.g. cf. Dancy, 2004; Ross, 1930). And again, according to the framework of affectual intuitionism that we use, such context-sensitive ethical concerns can give rise to justified emotional responses (Roeser, 2018, 2011). Therefore, it can be argued that more negative emotions are justified when a higher total amount of harm is expected.

2.3. *Emotional responses depending on self-relevance*

Both citizens for whom an energy project is self-relevant, in the sense that they are potentially personally affected by it, and citizens for whom the project is not self-relevant, in the sense that they are personally not affected by it, may be involved in the public debate and decision making about it. It is therefore valuable to understand people's emotional responses to the distribution of negative outcomes of energy projects and related ethical concerns both when one's own household is potentially affected – as when an energy project will take place in one's own municipality – and when one's own household is certainly not affected – as when an energy project will take place in another municipality.

In line with the Not In My Backyard (NIMBY) concept, which proposes that community opposition to (undesirable) local projects, including local energy projects, stems from self-interests (e.g. Dear, 1992; Krause et al., 2014; Schively, 2016; Wolsink, 1994), we could expect that a project that is self-relevant induces stronger emotions than one which is not self-relevant. Specifically, it is possible that people respond with stronger emotions to ethical concerns when these concerns are self-relevant. Two experimental studies on unfair treatments in other domains (an unequal distribution of a financial reward) indeed suggest that people respond with stronger anger-related emotions to an unfair treatment when triggered to think more about themselves or when the unfair treatment affects themselves or a person for whom they had been led to feel empathic concern (Batson et al., 2007; Van den Bos et al.,

[6] Similar to perceived distributive unfairness, a higher perceived total amount of harm may also be related to more sympathy-related emotions and less joy-related emotions.

2011). Based on this, it can be expected that people respond with stronger anger-, fear- and sympathy-related emotions in response to ethical concerns (i.e., perceived distributive unfairness and perceived total harm) when the project is self-relevant (i.e., taking place in one's own municipality) than when the project is not self-relevant (i.e., taking place in another municipality). Mirroring that, positive emotions may also decline more strongly in response to the ethical concerns when the project is self-relevant. However, over the years scholars have regularly criticized the NIMBY concept for focusing on self-interests, as citizens often have legitimate and even moral reasons for objecting to a local project rather than mere self-interests (e.g. Devine-Wright, 2009; Devine-Wright and Devine-Wright, 2005; Huijts et al., 2013; van der Horst, 2007; Wolsink, 1994). If self-interests play indeed only a limited role in how people respond to new local energy projects, the hypothesized moderating effect of self-relevance might be only of small size or even insignificant.

2.4. The current study

In this study, we investigate distributive justice as a morally justifiable, ethical concern as the basis of emotions resulting from an unequal distribution of negative outcomes of a local renewable energy project (henceforth called in short unequal distribution). Specifically, we test the following assumptions. First, in line with affectual intuitionism (Roeser, 2011, 2018) according to which deontological considerations can give rise to justified emotions, we hypothesize that people will perceive an *unequal* distribution as more unfair than an equal distribution and will, in turn, experience more negative emotions towards the energy project (hypothesis 1). As different emotions may have different consequences for behavior, we test this hypothesis for different emotions, namely anger-, fear-, sympathy- and joy-related emotions. Furthermore, leading to a reversed effect, we argued that an *equal* distribution may have – and may thus be perceived to have – a higher total amount of harm than an unequal distribution, which may also lead to more negative emotions, and should therefore be explored. Perceived total amount of harm is also an ethical, namely a utilitarian consideration, which would give rise to justified emotions. Fig. 1 shows these expectations in a conceptual model.

Second, we investigate whether emotional reactions to the ethical concerns differ depending on self-relevance. We hypothesize that people respond with stronger negative emotions to the ethical concerns when the situation is self-relevant, meaning that one is potentially personally affected by the distribution of negative outcomes (hypothesis 2).

As a case in point, we choose a local, ultra-deep geothermal energy project in the planning phase because of the following reasons. First, ultra-deep geothermal energy is an important renewable energy source that can significantly contribute to climate change mitigation (IPCC, 2011). Yet, it also comes with negative outcomes such as nuisance during the construction (sounds, lights, heavy traffic) and risks of water contamination and earthquakes, and has raised concerns and negative emotions among citizens about these outcomes (Carr-Cornish and Romanach, 2014; Cousse et al., 2021; Pellizzone et al., 2017). Second, drilling for ultra-deep geothermal energy could potentially be done in one location or several dispersed locations, resulting in either a less or a more equal distribution of the technology – thus affecting distributive justice – and potentially affecting either less or more people with negative outcomes – thus affecting the total amount of harm. Third, the technology is rather new, which implies that participants will have rather little prior knowledge about the technology and will thus respond primarily to the applied experimental manipulations, rather than based on prior opinions about the technology. Fourth, focusing on a local energy project is topical as it is in line with the necessity of the energy transition to importantly take place at the local level (Irshaid et al., 2021). Fifth, we focus on a project in the planning phase because in that phase people may experience particularly strong emotions, such as being worried about potential negative outcomes (Huijts et al., 2019; van der Horst, 2007).

3. Methodology

3.1. Participants

Data were collected from December 15th, 2017 until January 31st, 2018, through an online survey. Participants were recruited via a data-gathering company (www.thesistools.com). As the scenarios we applied in our experimental manipulations focused on a medium-sized Dutch

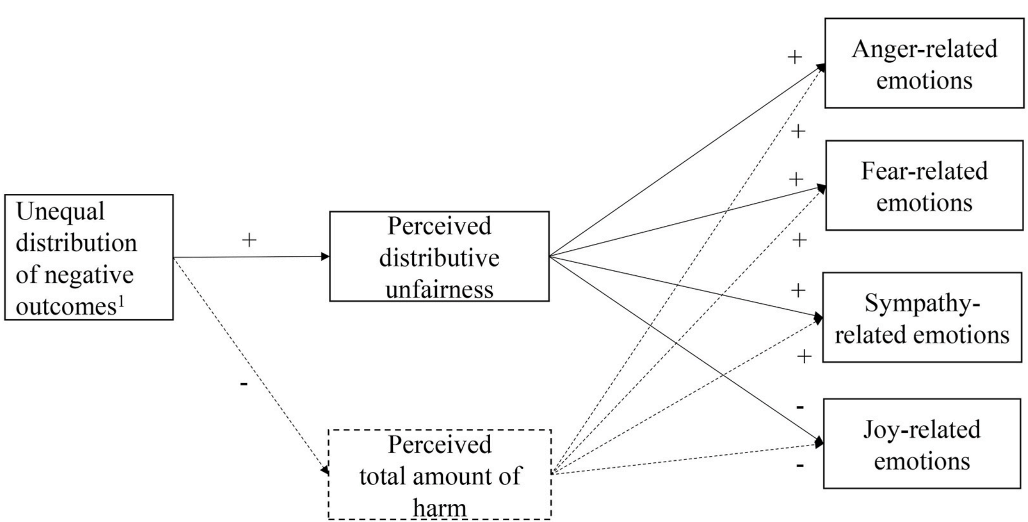

Fig. 1. The potential associations between the unequal distribution of negative outcomes, perceived fairness, and emotions (full lines), while considering the potential additional mediating effect of perceived total amount of harm (dashed lines).
Note. [1] Unequal distribution as compared to an equal distribution.

municipality of 200,000 inhabitants, we aimed at recruiting participants living in a medium-sized municipality (rather than in a small town or a large city) as for these participants the scenarios would be more realistic and meaningful. To find a sufficient number of participants, persons living in municipalities between 50,000 and 400,000 inhabitants were invited to participate. At the time of the data-collection, 76 Dutch municipalities fitted this range (www.cbs.nl). Participation was voluntary, not rewarded, and followed informed consent. The study received ethical clearance by the Human Research Ethics Committee of the TU Delft .

To test our hypotheses, we calculated that a minimum sample size of 266 was needed based on a power analysis with the assumption of an effect size of 0.2 (which is in between a small (0.1) and medium (0.3) effect size (Cohen, 1988)), a significance level of 0.05 and a power level of 0.95. As we had multiple research goals for the complete data set, we aimed to have at least 500 participants. Finally, 679 respondents answered all the key questions for the current paper, were at least 16 years old and mentioned a Dutch municipality. Of these, 397 respondents failed the attention check (see section 2.3.) and were excluded from further analyses. The final sample consisted of 282 respondents, which was above the calculated minimum sample size.

The sample consisted of 158 men and 122 women; one person did not disclose their gender. The age varied between 16 and 87 years of age ($M = 54$, $SD = 17$). The large majority of respondents had a higher level of education; 85% of the respondents had finished higher levels of middle school (preparing for university) or university education (obtaining a BSc degree or higher). A limited number of respondents had a lower level of education (13%; 4 missing items). The participants of the final sample more often had a higher education level than those excluded from the sample (in the excluded sample 74% had a higher level of education; t (661.02) = −3.90, p = .000). There was no significant difference in terms of gender and age between the selected and excluded sample.

3.2. Procedure and design

Respondents first gave their informed consent and answered a few questions not relevant to the present study. Next, they read information on ultra-deep geothermal energy and on a specific, hypothetical local project, which contained the experimental manipulation, which we explain below. Then, the respondents answered questions about the hypothetical project, including their emotions, perceived distributive unfairness, perceived total amount of harm and a manipulation check.

The study applied a 2 (equal vs. unequal distribution) by 2 (self-relevant relevant vs. not self-relevant) between-subjects factorial design. The first factor manipulated the distribution of negative outcomes of a hypothetical ultra-deep geothermal energy project, presenting the outcomes as either equally distributed (drilling locations are spread out over the municipality) or unequally distributed (drilling locations placed in one part of the municipality, in a concentrated way). The second factor manipulated the self-relevance of the energy project and presented the project to be either self-relevant (i.e., take place in one's own municipality) or not (i.e., taking place in another municipality in the province the participant was living in). For this, the participants were asked to imagine that the project takes place in either their municipality or in another middle-sized municipality in their province. To strengthen the imagination, they were asked to write down the name of their own municipality or the name of another middle-sized municipality in their province, respectively. The provided name was then used in further text and questions (see [mentioned municipality] below). Table 1 shows the presented manipulation texts per experimental factor level. The full information text presented to the participants can be found in Appendix 1. Participants were randomly assigned to one of the four experimental conditions. Per condition, we had between 62 and 93 participants (see Table 2).

Table 1
Manipulation texts per experimental factor level.

Experimental factor "Self-relevance"	
Self-relevant	(…) we want to ask you to imagine that this specific project takes place in *your municipality*, so that you can better imagine what a specific project would look like. (…) Imagine that this project takes place in *your municipality. Write here in which municipality you live.*
Not self-relevant	(…) we want to ask you to imagine that this specific project takes place in *another municipality in your province*, so that you can better imagine what a specific project would look like. (…) Imagine that this project takes place in *your province, in another municipality than yours. Think about a middle-sized municipality (50.000 to 400.000 inhabitants). Write here which municipality you are thinking of.*
Experimental factor "Distribution of negative outcomes"	
Equal distribution	A study shows that it is possible to generate enough electricity when at each of seven different locations two pipelines are placed.[a] The study also shows that, due to characteristics of the underground, it is best to *spread out the drilling locations over the municipality. As a result of the spreading out of the well locations, the nuisance during the construction (for example of light or drilling sounds) and the risks (of explosion, earth quakes, or leakage) during and after construction will be reasonably evenly spread over the inhabitants over the municipality*.
Unequal distribution	A study shows that it is possible to generate enough electricity when at each of seven different locations two pipelines are placed. The study also shows that, due to characteristics of the underground, it is best to *place all the drilling locations in one part of the municipality, in a concentrated way. As a result of this, the households in this part of the municipality will experience the largest part of the nuisance during the construction (for example strong light or drilling sounds) and of the risks during and after construction (such as explosion, earth quakes or leakage). Households in other parts of the municipality will have much less or no nuisance and risks at all.*

[a] The number of drilling locations the scenarios refer to, i.e. seven, was picked according to the recommendations by a geothermal expert who calculated a need of seven ultra-deep wells to generate enough electricity for a medium-sized municipality of 200,000 inhabitants.

Table 2
Number of respondents per experimental condition.

	Self-relevant	Not self-relevant
Equal distribution	63	64
Unequal distribution	93	62

3.3. Measures

Emotions. We used items from the emotion scales of Böhm and Pfister (2000) and Midden and Huijts (2009) and adjusted them to represent the four types of emotions and to fit with the presented hypothetical project. The emotions were assessed with two main questions. First it was asked 'To what extent do you experience the following emotions when you think about the described geothermal project in [mentioned municipality][7]' (0 not at all, 5 very strongly). The emotions items included three joy-related emotions (happy, satisfied, and hopeful), four anger-related emotions (angry, irritated, indignant, and upset), and three fear-related emotions (worried, afraid, and powerless). Then it was asked, to which extent the respondents felt the following emotions when thinking about the people in [mentioned municipality] that would suffer from the nuisance (such as from noise and strong lights) and the risks (such as of earthquakes and leakages). Three sympathy-related emotions were assessed (sympathy, pitiful, and concerned for these

[7] [Mentioned municipality] was replaced in all questions with the name of the municipality that the participants had written down earlier in the questionnaire (see Procedure and design).

people). We tested the factor structure of the emotion items, confirming our assumption that the items are structured in four factors representing anger-, fear-, sympathy- and joy-related emotions (see Appendix 2). More specifically, a measurement model with a four-factor structure had a better data fit than a model with a one factor structure (modeling all emotions in one factor) or a model with a three-factor structure (modeling joy-related, sympathy related and anger/fear related emotions in different factors respectively). For all further analyses, the items of each emotion factor were averaged ($\alpha = 0.91$ for anger-related emotions, $\alpha = 0.82$ for fear-related emotions, $\alpha = 0.86$ for sympathy-related emotions, and $\alpha = 0.87$ for joy-related emotions).

Perceived distributive unfairness. The perceived unfairness of the outcome distribution was assessed with two questions asking respectively how fair or unfair and how just or unjust they find the distribution of all advantages and disadvantages of the described project over the different inhabitants of [mentioned municipality]' (−3 = very fair to +3 = very unfair, and −3 = very just to +3 = very unjust; 0 was not included. The items formed a consistent scale (Spearman-Brown coefficient = 0.90) and were averaged.

Perceived total amount of harm. The perceived amount of harm for all inhabitants of the respective municipality was assessed with one question, 'If you think about all inhabitants of the municipality, how small or large do you think that the disadvantages of the described project are for all inhabitants together' (−3 = very small, +3 = very large; 0 was not included).

Attention check. Respondents were presented with two statements about the manipulation of self-relevance and four statements about the manipulation of the distribution of the negative outcomes and were asked to indicate which of the statements had been in the presented information about the hypothetical ultra-deep geothermal project. The text stated that one or more statements can be correct. For the self-relevant manipulation, the correct statement was: 'the described ultra-deep geothermal project will take place in your municipality'. For the not self-relevant condition the correct statement was: 'the described ultra-deep geothermal project will take place in another municipality in your province'. For the equal distribution manipulation, the two correct statements were: 'the study showed that it is best to spread out the drilling locations over the municipality' and 'the nuisance and risks will be reasonably equally spread over the inhabitants of the municipality'. For the unequal distribution manipulation, the two correct statements were: 'the study showed that it is best to place all the drilling locations in one part of the municipality' and 'households in one part of the municipality will have much more nuisance and risks than households in other parts'. In addition to these statements, the statement 'none of the above statements were in the information' was presented to allow people to choose this if they thought none of the statements was correct. Participants that selected the three correct statements only – depending on the experimental condition they had been assigned to – passed the attention check. Those that did not pass were excluded (see section 2.1.).[8] Unexpectedly, only a minority of the respondents (282 out of 679) completely passed the attention check. This might be due to respondents not paying enough attention when reading the manipulation texts, but also because the attention check question may have been difficult to answer. The reason was that three out of seven answers were correct, while we indicated that one or more answers might be correct; people may have easily missed one or two correct answers.

3.4. Method of analysis

We tested our model on the effects of an unequal distribution on perceived distributive unfairness, perceived total amount of harm, and emotions with path analysis in IBM AMOS (see Fig. 1 for the model).[9] We modeled correlations between perceived distributive unfairness and perceived total amount of harm, and between the four emotions as they might be similarly affected by factors not investigated in this study (Huijts et al., 2012) and thus have common variance not explained by the tested factors. Furthermore, we controlled for age as the mean age differed significantly between conditions and was correlated with sympathy-related emotions. Bootstrapping with 20,000 samples was applied to estimate bias-corrected confidence intervals of the tested effects[10]. 90% confidence intervals were estimated for the directional hypotheses (i.e., the effects mediated by perceived distributive unfairness and perceived total amount of harm) and 95% confidence intervals for additional effects for which we had no specific directional hypotheses (i.e., the direct and total effects of an unequal distribution on emotions). The confidence intervals for the indirect effects of the unequal distribution on the emotions via perceived distributive unfairness and perceived total amount of harm were estimated with Monte Carlo simulations with 20,000 samples and 90% confidence intervals using IBM SPSS 25.

Finally, to test whether the effects between variables in the model depend on self-relevance, we created a multi-group model in AMOS. We tested for each direct effect whether constraining it to be equal in both groups and for each mediation effect whether constraining the involved paths to be equal in both groups affected the fit of the model. When the χ^2 was significantly larger in the constrained model, we concluded that there was a significant difference in the effects between the conditions (Kline, 2016).

Appendix 3 reports the means, standard deviations, and intercorrelations of an unequal distribution, perceived distributive unfairness, perceived total amount of harm and all emotions for the entire selected sample (i.e., self-relevant and not self-relevant conditions combined) and for the self-relevant and not self-relevant conditions separately.

4. Results

4.1. Effects of an unequal distribution on perceived distributive unfairness, perceived total amount of harm, and emotions

We first tested our model for the entire sample (i.e., self-relevant and not self-relevant conditions combined). The results of the path and mediation analyses are presented in Fig. 2, Table 3 and Table 4. The tested model fits the data well ($\chi2 = 2.31$, $df = 1$, $\chi2/df = 2.31$, $p = .129$, CFI = 1.00, RMSEA = 0.07 (90% CI 0.00, 0.19), SRMR = 0.02 (Hu and Bentler, 1999)).

In line with our first hypothesis, the mediation effects of an unequal distribution on the emotions via perceived distributive unfairness were all significant, and in the expected direction (see Table 4). In more detail, the unequal distribution led to more perceived distributive unfairness, which in turn lead to more anger-, fear-, and sympathy-related emotions and less joy-related emotions (see Table 3). The effects of

[8] We ran the analyses also for the full sample (N = 679), thus without excluding participants based on the attention check. The results were largely the same, although for the full sample some of the effect sizes were smaller and sometimes not significant. Particularly the effect of unequal distribution on perceived total amount of harm was smaller and not significant in the full sample. See appendix 6 for the analyses with the full sample.

[9] Path analysis is an extension of multiple regression analyses to estimate the magnitude and strength of effects within a hypothesized causal system, including mediation effects (Lleras, 2005).

[10] Compared with conventional significance tests, bootstrap confidence intervals quantify the uncertainty as well as the accuracy of estimates and bootstrapping is a more robust approach (Wood, 2004).

[11] Standardized regression coefficients are calculated by default in AMOS based on z-standardized variables, which are calculated by subtracting the mean and then dividing by the standard deviation (Kline, 2016).

Table 3
Maximum likelihood estimates of the hypothesized direct effects[a].

Independent variable	Dependent variable	*B*	*SE*	LL	β	UL
Unequal distribution[b]	Perceived distributive unfairness	1.80	.19	.41	**.50*****	.57
	Perceived total amount of harm	-.38	.22	-.20	-.10*	.00
Perceived distributive unfairness	Anger-related emotions	.16	.04	.20	**.30*****	.40
	Fear-related emotions	.23	.04	.26	**.37*****	.47
	Sympathy-related emotions	.26	.04	.28	**.39*****	.49
	Joy-related emotions	-.32	.05	-.54	**-.44*****	-.34
Perceived total amount of harm	Anger-related emotions	.23	.03	.36	**.44*****	.51
	Fear-related emotions	.25	.04	.33	**.41*****	.50
	Sympathy-related emotions	.22	.04	.23	**.33*****	.42
	Joy-related emotions	-.24	.04	-.43	**-.34*****	-.26

[a] $N = 282$. Estimated with AMOS 22.0.0. CI = 90% bias corrected confidence interval. Bootstrap samples = 20,000. B = unstandardized regression coefficient, SE = standard error, LL = Lower level, β = standardized regression coefficient,[11] UL = Upper level. [b] Equal distribution is coded as 0 and unequal distribution as 1. *p < .10, **p < .05, ***p < .01.

perceived distributive unfairness on fear-, sympathy- and joy-related emotions, and as a result of that also the mediated effect of an unequal distribution on these emotions via perceived distributive unfairness, were somewhat stronger than for the anger-related emotions.

The mediation effects of an unequal distribution on all emotions via perceived total amount of harm were also all significant, and in the expected direction (see Table 4); the unequal distribution led to a (marginally significantly) lower perceived total amount of harm, which in turn led to (significantly) less anger-, fear-, and sympathy-related emotions and more joy-related emotions (see Table 3). The effects of perceived total amount of harm on the different emotions, and as a result of that also the mediated effects of an unequal distribution on the emotions via perceived total amount of harm, were almost equally large for the different emotions.

Comparing the mediation effects via perceived distributive unfairness and perceived total amount of harm, we found that the mediated effect of an unequal distribution on emotions was larger via perceived distributive unfairness than via perceived total amount of harm. The reason is that an unequal distribution had a much smaller effect on perceived total amount of harm than on perceived distributive unfairness (see Table 4). The associations between perceived distributive unfairness and perceived total amount of harm, respectively, and emotions were rather similar in size (ranging in absolute size between 0.30 and 0.44; see Table 3), thus not contributing to the difference in the size of the mediated effects.

While the difference in size of the mediated effects could have resulted in an unequal distribution causing – overall – more negative emotions and less positive emotions, the total effect of an unequal distribution on three of the emotions groups (*anger-, fear- and joy*-related emotions) was insignificant. This was due to a remaining direct effect of an unequal distribution on the emotions, of similar size to, but in opposite direction of, the effect mediated by perceived distributive unfairness (see Fig. 2 and Table 4). The total effect of an unequal distribution on *sympathy*-related emotions, on the other hand, was significant and positive due to the fact that the direct effect between these variables was small and not significant, and that the mediator perceived distributive unfairness largely explained the effect between the two variables.

4.2. Differences between the self-relevant and not self-relevant condition

We expected that people respond with stronger negative emotions to the distribution of negative outcomes of an energy project and the related ethical concerns when the hypothetical project would be self-relevant (i.e., taking place in one's own municipality and thus potentially affecting one's own household) rather than not self-relevant (i.e., taking place in another municipality; hypothesis 2). Therefore, we first tested for differences in any of the direct effects between the self-relevant and not self-relevant condition.

The results show that only two significant differences emerged: the effects of perceived total amount of harm on anger- and fear-related emotions were significantly different between the self-relevant and not self-relevant conditions ($\Delta\chi2 = 4.16$, $\Delta df = 1$, $p = .041$ and $\Delta\chi2 = 7.22$, $\Delta df = 1$, $p = .007$ respectively). Against our expectation, the effects were significantly larger when the situation was not self-relevant (*βs* are 0.52 and 0.55) rather than self-relevant (*βs* are 0.36 and 0.28 respectively; see Table 5).

Next, we tested for differences in the indirect effects (i.e., mediated effects of an unequal distribution on the emotions via perceived distributive unfairness and perceived total amount of harm). Only one significant difference emerged: the effect of an unequal distribution on fear-related emotions mediated by perceived total amount of harm was significantly different between the self-relevant and not self-relevant condition ($\Delta\chi2 = 7.28$, $\Delta df = 2$, $p = .026$). Again against our expectations, this mediated (negative) effect was larger for the not self-relevant condition ($ab = -.07$) than for the self-relevant condition ($ab = -.03$); when the project was said to take place in another municipality, people responded with more fear-related emotions to the perceived total amount of harm about an equal distribution, than when the project was said to take place in the own municipality. See Table 6 for the indirect, direct and total effects between variables in the self-relevant and not self-relevant conditions.

Table 4
Indirect, direct and total standardized effects of an unequal distribution on the emotions[a].

	Indirect effects via						Direct effects			Total effects		
	Perceived distributive unfairness			Perceived total amount of harm								
Dependent variables:	LL	*ab*	UL	LL	*Ab*	UL	LL	*β*	UL	LL	*β*	UL
Anger-related emotions	.10	.15	.21	-.08	-.04	<.00	-.26	**-.15*****	-.04	-.16	-.05	.07
Fear-related emotions	.12	.18	.24	-.08	-.04	<.00	-.27	**-.16*****	-.05	.10	-.02	-.14
Sympathy-related emotions	.13	.19	.26	-.07	-.03	<.00	-.14	-.03	.09	.02	**.14****	.25
Joy-related emotions	-.28	-.22	-.16	>.00	.03	.07	.12	**.23*****	.35	-.07	.05	.17

[a] $N = 282$. Standardized effects are presented. *ab* is the indirect effect via the mediating variable. The confidence intervals for the indirect effects estimated with Monte Carlo simulation are 90%. The confidence intervals for the direct and total effects estimated in AMOS are 95%. Bootstrap samples = 20,000. LL = lower level of the confidence interval. UL = the upper level. *p < .10, **p < .05, ***p < .01 (only available for the direct and total effects).

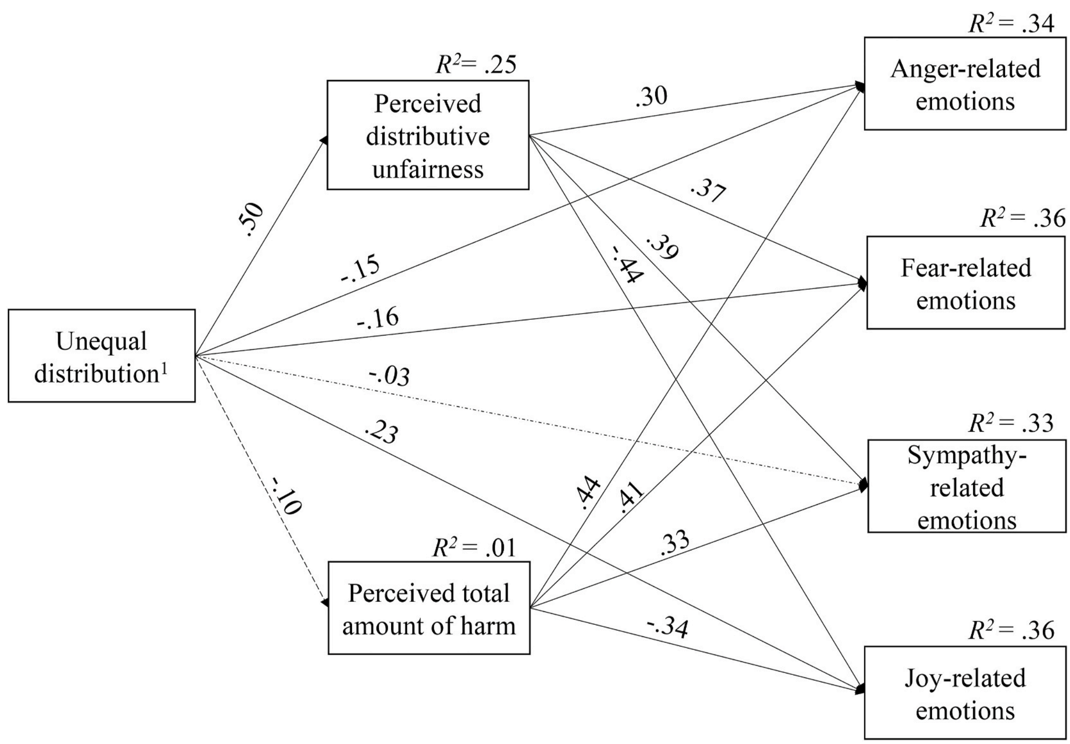

Fig. 2. Results from path analysis using AMOS version 22.0. *Note. N* = 282. Standardized effects are displayed. Solid lines represent significant effects, the dashed line represent a marginally significant effect, and the dash-dotted line represents a non-significant effect. All the effects are tested with one-sided *p* values except for the direct effects of an unequal distribution on the emotions, which are tested two-sided. [1] Equal distribution is coded as 0 and unequal distribution as 1. The effects of age, and the correlations between perceived distributive unfairness and perceived total amount of harm, as well as between the emotions, can be found in Appendix 4 and 5.

Table 5
Maximum likelihood estimates of the hypothesized direct effects in the not self-relevant and self-relevant groups separately.

Independent variable	Dependent variable	Not self-relevant n = 126			Self-relevant n = 156		
		LL	β	UL	LL	B	UL
Unequal distribution[b]	Perceived distributive unfairness	.47	**.59*****	.68	.29	**.41*****	.53
	Perceived total amount of harm	-.29	-.13	.02	-.23	-.11	.03
Perceived distributive unfairness	Anger-related emotions	.10	**.28*****	.45	.19	**.31*****	.44
	Fear-related emotions	.27	**.40*****	.54	19	**.34*****	.48
	Sympathy-related emotions	.26	**.41*****	.55	.22	**.37*****	.51
	Joy-related emotions	-.58	**-.42*****	-.25	-.58	**-.45*****	-.31
Perceived total amount of harm	Anger-related emotions	.40	**.52*****	.62	.24	**.36*****	.47
	Fear-related emotions	.44	**.55*****	.65	.15	**.28*****	.41
	Sympathy-related emotions	.22	**.36*****	.50	.15	**.28*****	.41
	Joy-related emotions	-.56	**-.44*****	-.31	-.38	**-.25*****	-.12

[a] Estimated with AMOS 22.0.0. CI = 90% bias corrected confidence interval. Bootstrap samples = 20,000. LL = Lower level, β = standardized regression coefficient, UL = Upper level.
[b] Equal distribution of negative outcomes is coded as 0 and unequal distribution of negative outcomes as 1. *p < .10, **p < .05, ***p < .01.

Table 6
Indirect, direct and total standardized effects of an unequal distribution of negative outcomes on the emotions in the not self-relevant and the self-relevant groups separately[a].

	Indirect effects via						Direct effects			Total effects		
	Perceived distributive unfairness			Perceived total amount of harm								
Dependent variables:	LL	*ab*	UL	LL	*ab*	UL	LL	*β*	UL	LL	*β*	UL
Not self-relevant (n = 126):												
Anger-related emotions	.06	**.16**	.27	-.15	-.07	.01	-.30	-.11	.07	-.20	-.02	.17
Fear-related emotions	.15	**.24**	.33	-.16	-.07	.01	-.36	**-.20****	-.05	-.23	-.04	.14
Sympathy-related emotions	.15	**.24**	.33	-.11	-.05	.01	-.17	.00	.18	.02	**.19****	.36
Joy-related emotions	-.36	**-.25**	-.14	-.01	.06	.13	.03	**.22****	.40	-.14	.03	.22
Self-relevant (n = 156):												
Anger-related emotions	.07	**.13**	.20	-.09	-.04	.01	-.33	**-.18****	-.03	-.25	-.09	.07
Fear-related emotions	.07	**.14**	.22	-.07	-.03	.01	-.29	-.14*	.01	-.19	-.03	.13
Sympathy-related emotions	.08	**.15**	.23	-.07	-.03	.01	-.23	-.08	.07	-.11	.05	.20
Joy-related emotions	-.27	**-.19**	-.11	-.01	.03	.07	.11	**.26*****	.41	-.05	.10	.25

[a] Standardized effects are presented. *ab* is the indirect effect via the mediating variable. The confidence intervals for the indirect effects estimated with Monte Carlo simulation are 90%. The confidence intervals for the direct and total effects estimated in AMOS are 95%. Bootstrap samples = 20.000. LL = Lower level. UL = Upper level. *p < .10, **p < .05, ***p < .01 (only available for the direct and total effects).

5. Discussion

Although emotions seem to play an important role in how citizens respond to the transition to renewable energy systems, which may affect its success, little insights exist into causes of those emotions. In this study, we addressed normatively justifiable ethical concerns as possible causes of emotions towards a local energy project. This is not only relevant for instrumental reasons of making energy policies more successful, but also for creating *socially responsible* policy making (Roeser, 2018).

We first investigated the effects of an *unequal* distribution of negative outcomes (in short: unequal distribution) of a local, municipal renewable energy project and of related perceived distributive unfairness on emotions. In line with hypothesis 1, we found that people perceived an unequal distribution as more unfair than an equal distribution and, in turn, experienced more anger-, fear- and sympathy-related emotions and less joy-related emotions towards such an energy project. We argue that these responses are, from a philosophical point of view, in line with justified ethical considerations as from a deontological perspective an unequal distribution is a more unjust distribution than an equal distribution. Furthermore, in line with affectual intuitionism (Roeser, 2011, 2018), it would be ethically justified to respond with more negative emotions to this more unjust distribution. Our findings thus suggest that people indeed engage in a normatively justifiable ethical consideration around an energy project, and that this ethical consideration is linked with emotional responses. Emotions towards energy projects can thus indeed have a systematic base, which includes normatively justifiable ethical considerations.

We additionally explored whether perceived total amount of harm, which concerns the total amount of negative outcomes bestowed on all people together, is affected by the unequal distribution and relates to emotions. We found that an *equal* distribution was perceived to have a (marginally significantly) higher total amount of harm than an unequal distribution and, in turn, led to more anger-, fear- and sympathy-related emotions and less joy-related emotions towards the project. We argue that these responses are, from a philosophical point of view, in line with justified ethical considerations. From a utilitarian perspective, an equal distribution can be less acceptable than an unequal distribution, if the equal distribution implies a higher total amount of harm. In this case, in line with affectual intuitionism (Roeser, 2011, 2018), it can be ethically justified to respond with more negative emotions. Our findings again show that people seem to engage in normatively justifiable ethical considerations around an energy project, which are linked with emotional responses.

Yet against expectations, we did not find that people responded with stronger negative emotions to perceived distributive unfairness or to perceived total amount of harm when the situation was self-relevant rather than not self-relevant (hypothesis 2). If anything, the effects were stronger if the situation was not self-relevant. There are two potential explanations for this finding. First, this may be explained by construal level theory in the context of moral judgments: when a situation is psychologically more distant to people, people think in a more abstract manner and have stronger moral judgments, while people take contextual and extenuating factors more strongly into account when something is psychologically more nearby (Eyal et al., 2008; Mårtensson, 2017). An energy project that does not affect oneself as it takes place elsewhere is psychologically more distant and may therefore lead to stronger moral judgements than a project that potentially affects oneself. A second explanation could be optimism bias, a tendency of people to judge the likeliness of negative outcomes for themselves lower than for others that are similar to them (Weinstein, 1980). We particularly found that people responded with significantly less anger- and fear-related emotions to perceived total amount of harm when the energy project was personally relevant. This could be a result of people thinking that the harm would not likely affect themselves (strongly) in the self-relevant case. Overall, finding that the participants did not respond with stronger negative emotions to the studied ethical concerns when the situation was self-relevant suggests that people truly engaged in ethical considerations rather than responding to self-interested concerns only. This finding contributes to a growing stream of literature that criticizes the use of the term NIMBY (Not In My BackYard) for characterizing citizens' resistance to local energy developments as simply self-interested and egoistic and that shows that citizens often have legitimate and even moral reasons for objecting to a local project (Devine-Wright, 2009; Devine-Wright and Devine-Wright, 2005; Huijts et al., 2013; van der Horst, 2007; Wolsink, 1994).

Noteworthy, the effects of unequal distribution on emotions were more strongly mediated by perceived distributive unfairness than by perceived total amount of harm. Because unequal distribution, via perceived distributive fairness, lead to more negative and less positive emotions, this could have resulted in an unequal distribution causing – overall – more negative and less positive emotions. However, we found that the total effect of unequal distribution on three of the emotions (*anger-, fear- and joy*-related emotions) was insignificant. This was due to remaining direct effects of an unequal distribution on the emotions of similar size to, but in opposite direction of, the effects mediated by perceived distributive unfairness. These remaining direct effects suggest that one or more additional concerns (Zhao et al., 2010) besides the measured deontological and utilitarian concerns are likely to have affected people's emotions towards the unequal distribution. Further research, including qualitative research, could investigate what these other concerns could be.

The total effect of an unequal distribution on *sympathy*-related emotions, on the other hand, was significant and positive due to the fact that the mediator perceived distributive unfairness largely explained the effect between the two variables, and that the remaining direct effect between these variables was small and not significant. As sympathy or empathy has been found to relate to prosocial behaviors (Eisenberg and Miller, 1987), a potential consequence of these findings may be that citizens may be more motivated to take actions to help negatively affected people when they are unequally and unfairly, negatively affected. Further research could provide more insight into the underlying psychological processes that are causing and affecting the relation between unequal distribution, sympathy-related emotions and prosocial behavior in the context of renewable energy projects.

Our findings extend the literature in several ways. First, the finding that an unequal distribution of *negative* outcomes of a renewable energy project in terms of risks and nuisance is perceived as more unfair, which in turn leads to more negative emotions, is extending the literature showing that the unequal distribution of positive or negative outcomes of a *financial* nature is perceived as more unfair and less preferable and leads to more negative emotions (Kayser and Lamm, 1980; Tornblom and Jonsson, 1985; Van den Bos, 2001; Van den Bos et al., 2011) and literature finding that perceived unfairness is positively related to *anger- and fear-related* emotions in the context of energy projects or life in general (Dohle et al., 2012; Huijts, 2018; Huijts et al., 2014; Mikula et al., 1998; Scherer, 1997). Additionally, our findings show that perceived distributive unfairness is negatively related to joy-related emotions, for which inconsistent relations have been found between studies (Huijts, 2018; Scherer, 1997), and positively related to sympathy-related emotions, which has not yet been studied.

Second, different from previous research that finds that perceived unfairness is most often or most strongly associated with anger-related emotions (Dohle et al., 2012; Mikula et al., 1998; Scherer, 1997; Van den Bos, 2001; Van den Bos et al., 2011), we found that the association between perceived distributive unfairness and emotions was somewhat stronger for fear-, sympathy- and joy-related emotions than for anger-related emotions. Possibly, anger-related emotions were less strongly elicited in our study because no one was in control and could therefore be blamed for the chosen distribution of negative outcomes, which are factors that have been found to be associated with anger-related emotions (Kulik and Brown, 1979; Lerner et al., 2015). In the hypothetical project description, we explained that the distribution of wells was chosen based on 'characteristics of the underground', which is something that no one has control over, and thus no one can be blamed for. It is possible that a project description in which actors clearly exercise control (e.g. they have the option to choose between different distributions of wells) and decide to choose for an unequal distribution of negative outcomes for citizens, would lead to higher attribution of blame, and therefore more anger. Further research could compare the effect of an unequal distribution and of perceived distributive unfairness on anger-related emotions between scenarios that differ with regard to the level of control actors have over the distribution of negative outcomes.

Third, to our knowledge, this paper is the first to include the concept of perceived total amount of harm, related to utilitarian considerations, in an empirical study in the energy context. Our findings extend research in the context of environmental risks, including technical risks, that has shown that stronger perceived negative consequences and threat to people are associated with more negative emotions, such as anger and fear (Böhm, 2003; Böhm and Pfister, 2000; Huijts, 2018) and that, different from our study, did not find an association between perceived risks and joy (Huijts, 2018). Our findings further contribute to the expanding literature on energy justice (e.g. Jenkins et al., 2016, 2021; McCauley et al., 2019), which has widely discussed distributive justice, but has not yet included total amount of harm as an additional, related ethical consideration.

5.1. Limitations

Four limitations of the study may be addressed in further research. First, the study included only one specific case, namely an ultra-deep geothermal energy project with specific negative outcomes for which the distribution of wells was described to be a result of 'characteristics of the underground'. Further research could test the strength of ethical concerns and emotions about energy projects with other technologies, outcomes, distributions of outcomes, and reasons presented for the chosen distribution (e.g., leading to different levels of control and blame).

Second, only a minority of the respondents completely passed the attention check. This might be due to respondents not paying enough attention when reading the manipulation texts, but also because the attention check question may have been difficult to answer. Further research could provide information that is easier to process and use an attention check question that is easier to answer. However, as we largely find the same results for the main hypotheses in the full sample, the strict selection seems not to have affected the findings much. The main difference between the samples was that in the selected sample, the unequal distribution had a larger and marginally significant effect on perceived total amount of harm, while in the full sample the effect was smaller and even not marginally significant. This suggests that participants that were more attentive considered this side effect of a more equal distribution, while the less attentive participants did not.

Third, and related to that, it needs to be noted that the study directly aimed at manipulating the distribution of negative outcomes as equal or unequal and the manipulation texts emphasized that people would be either more or less evenly affected, which made it probably relatively easy to infer judgements of distributive fairness. However, the manipulation texts did not provide information on whether an unequal distribution would affect less people in total (especially when placing it in a less densely populated area of the town) and an equal distribution more people (as it could mean also placing it in more densely populated areas of the town), which would have facilitated inferences on total amount of harm. Further research could study whether and how more detailed information on siting affects people's responses to the different ethical concerns that are, to some extent, at odds with each other.

Fourth, the full sample, and even more so the selected sample, had a relatively high amount of people with a higher education level (BSc degree or higher). This means that the sample was not representative of the Dutch public. Studies have, however, shown that higher educated citizens are also more politically involved (Mayer, 2011; Perrin and Gillis, 2019) and more active in community energy initiatives (Radtke, 2014). Our sample may therefore be rather representative of particularly citizens that would become politically active in response to a local project. Further research should investigate the moderating role of education and political engagement on the relation between distributions of outcomes, ethical concerns, and emotions, as that may have further theoretical, ethical and practical implications.

6. Conclusion and policy implications

Our study indicates that the public has ethical concerns around local energy projects, which in turn explain people's emotional responses to the project, independent of whether the project is self-relevant. This suggests that emotional responses to energy projects have a systematic base, namely ethical concerns that are normatively justifiable. Following from this, we argue that rather than seeing the emotional responses by citizens as irrational, random nuisance to avoid (Cass and Walker, 2009) leading policy makers to either ignore emotions or follow them blindly (cf. Perlaviciute et al., 2018), policy makers should engage in probing ethical concerns underlying the emotions and encourage emotional-moral deliberation (Roeser and Pesch, 2016). This can be done through participatory approaches, such as for example consensus conferences, town hall meetings, citizen panels and focus groups (Gregory and Keeney, 1994; Jaeger et al., 2001; McDaniels et al., 1999; Sclove, 2000; van Asselt Marjolein and Rijkens-Klomp, 2002), taking place from the planning stage onwards so that the gained insights can be taken into account from the start of the project as well as when they arise during the development and implementation of the project. However, these approaches do not mention emotions, while we argue that emotions can play a crucial role in participatory decision making. Involving emotional-moral deliberation in participatory decision making, such as by asking citizens to reflect on the concerns underlying their emotions, can serve to elicit ethical concerns as well as contribute to the reflection on whether these are justified (Roeser and Pesch, 2016). Ethics experts can also play a role in this kind of deliberation, for example by helping to structure the arguments. Such an explicit emotional-moral deliberation can then shape the decision making about the energy project, for example leading to adjusted technology designs or implementation procedures.

There are several reasons for why public emotions and the underlying ethical concerns should be considered in energy policies. First, when these ethical concerns are normatively justifiable, based on ethical arguments that can be shared and understood by others, they should be taken into account in the policy making about energy projects to create a more *socially responsible* energy transition (Roeser, 2018). In other words, including citizens' ethical concerns in decision making about energy projects brings ethical issues to the fore that might otherwise get overlooked and leads to morally better decisions. The current study for example found in relation to different distributions of negative outcomes that two ethical considerations are at play, being the deontological and utilitarian ethical concerns of distributive fairness and total amount of harm respectively. Both these concerns should be incorporated in low-carbon energy policy making. That is, policy makers should aim to create a more equal and thus fairer distribution of negative outcomes, while at the same time making sure to minimize any increase in total amount of harm. In other words, rather than choosing for either a purely deontological approach or a purely utilitarian approach, policy makers should adopt a context-sensitive approach that tries to optimize both types of considerations if possible.

Besides this *substantive ethical reason,* there is also a *pragmatic reason* for why public emotions and the underlying ethical considerations should be considered in energy policies: as emotions may play a role in whether people accept or reject energy projects and policies (e.g. Contzen et al., 2021a; Huijts et al., 2014; Perlaviciute et al., 2018), understanding ethical underpinnings of emotions is also valuable from a pragmatic point of view, because taking ethical concerns into account may help to avoid costly delays or even cancelation of projects due to emotional resistance. The consideration of ethical concerns around (distributive) fairness specifically, is in line with the Fit for 55 policy package proposed by the European Union to combat climate change[12] and many academic studies into energy justice (e.g. Jenkins et al., 2016; Sovacool et al., 2016). However, while the forementioned studies have argued what fairness *should* entail, our study provides initial insights into how the public judges fairness and experiences emotions in response to different distributions of negative outcomes. As such, our study provides a starting point for developing energy policies that are not only considered fair by researchers or policy makers but are also *perceived* as fair by citizens, and thus more likely to gain public acceptance. It is important to note, however, that the increased acceptance of energy policies should be earned as a result of a procedurally fair and ethically insightful decision making process and not a goal in itself.

Finally, besides the substantive ethical and pragmatic reasons for why public emotions and the underlying ethical considerations should be considered in energy policies, there is also the *reason of procedural fairness and democratic principles:* it makes decision procedures more inclusive, fair and transparent as it takes citizens' perspectives into account.

We conclude that considering emotions and their underlying ethical concerns in decision-making is a promising route to ethically and socially more acceptable policies in general, and energy policies in particular. Concerns underlying emotions such as distributive fairness and total amount of harm in relation to unequal and equal distributions of negative outcomes respectively are justified ethical concerns that can and should be taken into account in energy policies.

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CRediT authorship contribution statement

Nicole M.A. Huijts: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Funding acquisition. **Nadja Contzen:** Conceptualization, Methodology, Writing – review & editing, Supervision. **Sabine Roeser:** Conceptualization, Writing – review & editing, Supervision, Project administration, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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[12] https://www.europarl.europa.eu/legislative-train/theme-a-european-green-deal/package-fit-for-55.

Appendix 1

Table A1
Information texts provided to the respondents.

Geothermal energy as a new, sustainable energy source in the Netherlands	
To halt climate change, the government wants to reduce CO_2-emissions in the Netherlands. For that reason, new sustainable are sources are sought. Ultra-deep geothermal energy is such a new possibility. For ultra-deep geothermal, drilling between 5 and 6 km deep is performed to capture heat. On June 19th of this year, the Dutch government and industry have signed an agreement in which they commit to working together and to introduce ultra-deep geothermal energy sources.	
In other countries in Europe and outside of Europe, several ultra-deep geothermal projects have been executed. In the Netherlands, only geothermal projects have taken place that go less than 4 km deep.	
After this, we first give you information about a specific application of ultra-deep geothermal, namely for the production of both heat and electricity. Then we give a description of a specific, hypothetical project. When reading this, we want to ask you to imagine that this specific project takes place in {another municipality in your province/your municipality}, so that you can better imagine what a specific project would look like.	
What is ultra-deep geothermal?	
Ultra-deep geothermal uses heat from the deep underground for the making of electricity. To retrieve the heat from the earth, two pipelines are brought into the ground. The pipelines go 5–6 km deep. One pipeline pumps up hot water, and the other one pumps the same water – cooled down – back into the same underground layer (see the image).	
The pumped-up water has a temperature of more than 150 °C. This water is used to actuate a turbine to make electricity. After that, the remaining heat is used to warm up buildings in the vicinity. An ultra-deep geothermal source can provide energy during at least 30 years.	
Benefits and drawbacks of ultra-deep geothermal	
The benefits are: - Less dependence of fossil fuels (oil, coal, gas). - Less air pollution, CO_2-emissions, and climate change than when using fossil fuels. - Constant supply of energy, different from wind and sun that fluctuate in supply throughout the day.	
The first disadvantage is that people living up to a few hundred meters away during the whole period of the construction (6 months, day and night) will experience: - Strong light of construction lamps - Heavy traffic - Drilling sounds such as low humming sounds	
A second disadvantage is that there are risks that are somewhat comparable to the risks of drilling for oil and gas. They are estimated to be small or very small. The risks are: - An explosion during the construction of the pipelines. When this happens, gas can be released with force, possibly accompanied by contaminated water. This could lead to broken windows and pollution of the soil around the drilling location. - Earthquakes during the construction of the pipelines - Leakage around the pipelines during and after use. This can lead to pollution of ground and surface water such as canals, rivers, and lakes.	
In the following, you receive a description of a hypothetical ultra-deep geothermal project.	
Self-relevant:	Imagine that this project takes place in your municipality. Write here in which municipality you live. ……..……..
Not self-relevant:	Imagine that this project takes place in your province, in another municipality than yours. Think about a middle-sized municipality (50.000–400.000 inhabitants). Write here which municipality you are thinking of. ……..……..
We will mention the name of the municipality that you write here in the following text.	
Please read the following information carefully and imagine that this is really happening in the municipality [mentioned municipality]. Take your time to imagine the situation as described.	
A possible ultra-deep geothermal project in the municipality [mentioned municipality]	
To realize a more sustainable energy supply, the municipality [mentioned municipality], together with the local water company[a], is currently looking into the possibility to execute an extensive ultra-deep geothermal project. The idea of the studied project is to produce enough electricity so that in principle the energy of all households in the municipality can be covered.	
A study shows that it is possible to generate enough electricity when at each of 7 different locations 2 pipelines are placed.	
Equal distribution condition	The study also shows that, due to characteristics of the underground, it is best to spread out the drilling locations over the municipality. As a result of the spreading out of the well locations, the nuisance during the construction (for example of light or drilling sounds) and the risks (of explosion, earth quakes, or leakage) during and after construction will be reasonably evenly spread over the inhabitants over the municipality.
Unequal distribution condition	The study also shows that, due to characteristics of the underground, it is best to place all the drilling locations in one part of the municipality, in a concentrated way. As a result of this, the households in this part of the municipality will experience the largest part of the nuisance during the construction (for example strong light or drilling sounds) and of the risks during and after construction (such as explosion, earth quakes or leakage). Households in other parts of the municipality will have much less or no nuisance and risks at all.
When the project is being executed, all households in this municipality get the opportunity to use the produced electricity but are not obliged to. The costs of the electricity will be similar to that of electricity produced from fossil fuels. The municipality and the water company decide in the coming months whether they are really going to execute the project.	

[a] In the Netherlands, the city of Groningen was preparing for the construction of a geothermal project at the time of writing this text. It was not an ultra-deep project, but it was also the case that the local water company was involved.

Appendix 2

To test whether we can statistically distinguish the four hypothesized emotions, we performed confirmatory factor analysis in IBM AMOS (version 22.0). We tested and compared the following three models: first, a one-factor model with all items assumed to load on one factor (representing overall emotions towards the project), second, a three-factor model with separate factors for (a) joy-related emotions (representing positive emotions towards the project), (b) anger- and fear-related emotions (representing negative emotions towards the project), and (c) sympathy-related emotions (representing emotions related to the affected people), and third, a four factor model with separate factors for (a) joy-related emotions, (b) anger-related emotions, (c) fear-related emotions, and (d) sympathy-related emotions. The fit of each of the confirmatory factor models was assessed using the indicators CFI, RMSEA, and SRMR (Hu and Bentler, 1999; Iacobucci, 2010; Kline, 2016)(Hu and Bentler, 1999; Iacobucci, 2010; Kline, 2016). To compare the fit of the models, differences in χ^2 were assessed.

The first model with one latent factor for all items did not have a good fit ($\chi2 = 956.61$, df = 65, $\chi2/df = 14.72$, p = .000, CFI = 0.664, RMSEA = 0.212 (90% CI: 0.201, 0.223), SRMR = 0.123; Hu and Bentler, 1999; Iacobucci, 2010; Kline, 2016)($\chi2 = 956.61$, df = 65, $\chi2/df = 14.72$, p = .000, CFI = 0.664, RMSEA = 0.212 (90% CI: 0.201, 0.223), SRMR = 0.123; Hu and Bentler, 1999; Iacobucci, 2010; Kline, 2016). The effects of the single latent variable on the observed variables ranged between 0.42 and 0.80 indicating that for some of the observed variables the latent variable was not a good predictor. The second model with three latent factors (positive emotions, negative emotions and sympathy-related emotions as separate factors) had a significantly better fit than the one-factor model ($\Delta\chi^2$ = - 664.80, Δdf = - 3, p = .000), but still not a good fit (χ^2 = 291.81, df = 62, $\chi2/df$ = 4.71, p = .000, CFI = 0.91, RMSEA = 0.12 (90% CI: 0.10, 0.13), SRMR = 0.08). The effects of the latent variables on the observed variables ranged between 0.66 and 0.88, indicating that the latent factors were moderately good to good predictors of the observed variables. The third model with four latent factors (with anger- and fear-related emotions now also as separate factors) had a significantly better fit than the three-factor model ($\Delta\chi^2$ = - 157.08, Δdf = - 3, p = .00) and a good overall fit (χ^2 = 134.73, df = 59, $\chi2/df$ = 2.28, p = .000, CFI = 0.97, RMSEA = 0.07 (90% CI: 0.05, 0.08), SRMR = 0.05; see Fig. 2 for effect sizes and correlations). The effects of the latent variables on the observed variables ranged between 0.70 and 0.89, indicating that the latent factors were good predictors of the observed variables. The emotions were all correlated with each other, with anger-, fear-, and sympathy-related emotions being positively correlated with each other, and negatively with joy-related emotions. To sum up, a four-factor structure of the emotion items fitted the data better than a three-factor or a one-factor model, which is in line with expectations.[13]

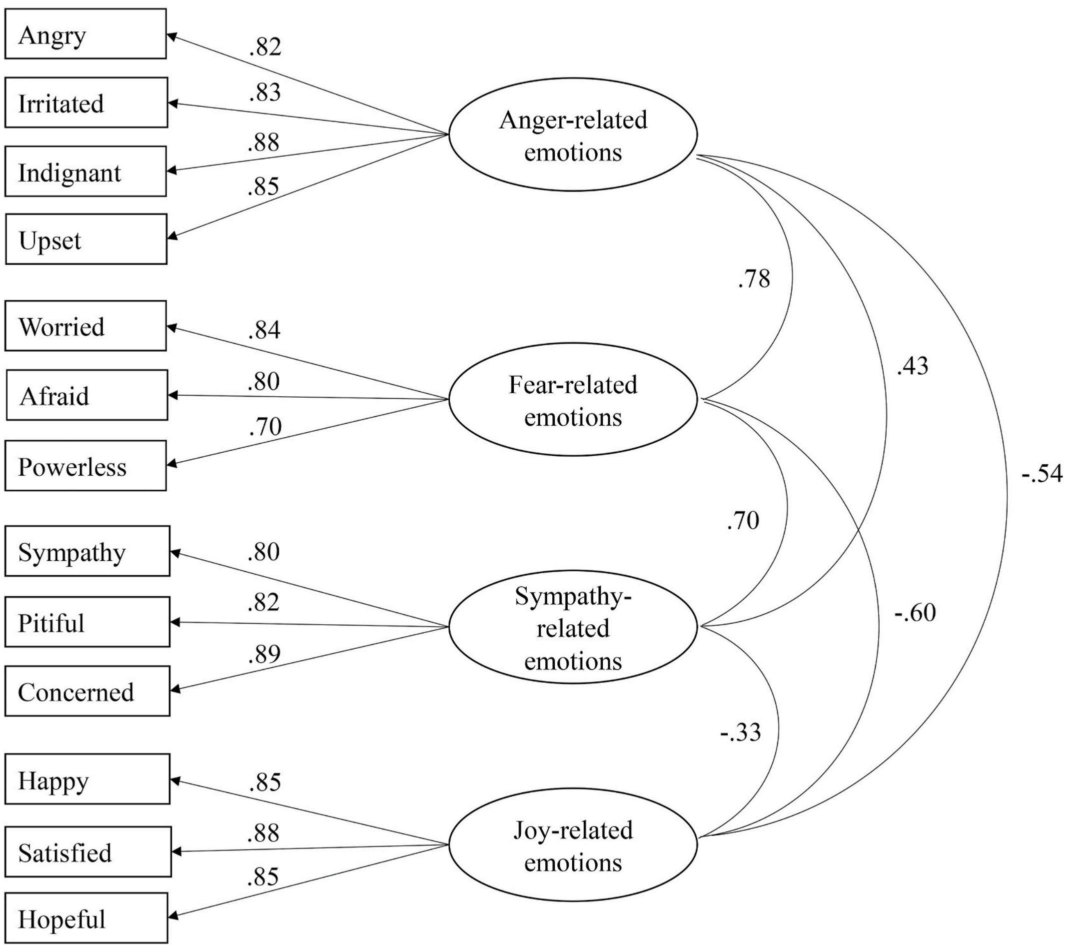

Fig. A2. Results from confirmatory factor analysis with four emotions[a]
[a] N = 282. Standardized effect sizes and correlations are reported.

Appendix 3

Table A2
Correlations, means, and standard deviations of tested variables[a].

		Correlations (p)						
		1	2	3	4	5	6	M (SD)
1	Unequal distribution[b]							
2	Perceived distributive unfairness	.50 (.000)						-.08 (1.81)
3	Perceived total amount of harm	-.11 (.078)	.23 (.000)					-.32 (1.83)
4	Anger-related emotions	-.05 (.376)	.32 (.000)	.53 (.000)				.66 (.98)
5	Fear-related emotions	-.03 (.662)	.38 (.000)	.52 (.000)	.69 (.000)			1.42 (1.12)
6	Sympathy-related emotions	.15 (.013)	.46 (.000)	.41 (.000)	.39 (.000)	.59 (.000)		2.42 (1.21)
7	Joy-related emotions	.06 (.327)	-.40 (.000)	-.48 (.000)	-.46 (.000)	-.51 (.000)	-.29 (.000)	2.29 (1.29)

[a] N = 282.
[b] Equal distribution of negative outcomes is coded as 0 and unequal distribution of negative outcomes as 1.

[13] Repeating the analyses for the self-relevant and not self-relevant conditions separately showed that in both conditions the fit of the four-factor model was also the best.

Table A3
Correlations, means, and standard deviations of tested variables in the self-relevant condition.

	$n = 156$	Correlations (p)						
		1	2	3	4	5	6	*M* (*SD*)
1	Unequal distribution							
2	Perceived distributive unfairness	.41 (.000)						.01 (1.80)
3	Perceived total amount of harm	-.10 (.208)	.21 (.010)					-.21 (1.80)
4	Anger-related emotions	-.08 (.300)	.32 (.000)	.46 (.000)				.65 (.90)
5	Fear-related emotions	-.03 (.757)	.34 (.000)	.38 (.000)	.66 (.000)			1.47 (1.11)
6	Sympathy-related emotions	.04 (.593)	.40 (.000)	.36 (.000)	.38 (.000)	.61 (.000)		2.55 (1.20)
7	Joy-related emotions	.10 (.234)	-.40 (.000)	-.39 (.000)	-.38 (.000)	-.47 (.000)	-.24 (.002)	2.21 (1.28)

Table A4
Correlations, means, and standard deviations of tested variables in the not self-relevant condition.

	$n = 126$	Correlations (p)						
		1	2	3	4	5	6	*M* (*SD*)
1	Unequal distribution							
2	Perceived distributive unfairness	.59 (.000)						-.19 (1.83)
3	Perceived total amount of harm	-.13 (.156)	.25 (.005)					-.47 (1.88)
4	Anger-related emotions	-.02 (.828)	.34 (.000)	.60 (.000)				.68 (1.08)
5	Fear-related emotions	-.04 (.664)	.42 (.000)	.68 (.000)	.72 (.000)			1.36 (1.14)
6	Sympathy-related emotions	.25 (.005)	.54 (.000)	.46 (.000)	.41 (.000)	.56 (.000)		2.26 (1.22)
7	Joy-related emotions	.03 (.730)	-.40 (.000)	-.57 (.000)	-.54 (.000)	-.55 (.000)	-.34 (.000)	2.39 (1.31)

Appendix 4

Table A5
The direct effects of age on all tested variables[a].

Independent	Dependent	*b*	SE	LL	β	UL
Age	Perceived distributive unfairness	.00	.01	-.08	.02	.12
	Perceived total amount of harm	-.01	.01	-.17	-.06	.06
	Anger-related emotions	.00	.00	-.15	-.05	.04
	Fear-related emotions	-.01	.00	-.17	-.07	.03
	Sympathy-related emotions	.01	.00	.05	**.15*****	.26
	Joy-related emotions	.01	.00	-.01	.09*	.18

[a] $N = 282$. Estimated with AMOS 22.0.0. CI = 95% bias corrected confidence interval. Bootstrap samples = 20,000. B = unstandardized regression coefficient, SE = standard error, LL = Lower level, β = standardized regression coefficient, UL = Upper level. p has 2-tailed significance level. *p < .10, **p < .05, ***p < .01.

Appendix 5

Table A6
Correlations (p-values) between variables in the SEM model for the total sample[a].

	2	3	4	5
1 Perceived distributive unfairness	.33 (.000)			
2 Perceived total amount of harm				
3 Anger-related emotions				
4 Fear-related emotions		.52 (.000)		
5 Sympathy-related emotions		.15 (.044)	.44 (.000)	
6 Joy-related emotions		-.18 (.007)	-.23 (.000)	.01 (.903)

[a] $N = 282$.

Appendix 6. The main results for all 679 respondents.

Similar to the selected sample of 282 participants, the confirmatory factor analysis for the emotion factors for all 679 respondents (so also for the participants that made one or more mistakes on the manipulation check) showed that the four-factor model was the best.

When including all 679 participants in the structural equation model, the findings showed, similar to the selected sample, a significant positive direct effect of unequal distribution on perceived unfairness. However, different from the selected sample, they do not show a significant direct effect of unequal distribution on perceived total amount of harm. These effects were also smaller in size than the effects found in the model for the selected sample. Similar to the selected sample, the effects of perceived unfairness and perceived total amount of harm on all four emotion factors was also significant. See Table A7.

Table A7
Maximum likelihood estimates of the hypothesized direct effects in the sample of 679 respondents[a].

Independent variable	Dependent variable	*B*	S.E.	LL	*β*	UL
Unequal distribution[b]	Perceived unfairness	1.28	.14	.30	**.36*****	.42
	Perceived total amount of harm	-.10	.13	-.09	-.03	.04
Perceived unfairness	Anger-related emotions	.20	.03	.25	**.31*****	.37
	Fear-related emotions	.20	.03	.23	**.29*****	.36
	Sympathy-related emotions	.26	.03	.31	**.38*****	.44
	Joy-related emotions	-.29	.03	-.45	**-.39*****	-.32
Perceived total amount of harm	Anger-related emotions	.25	.02	.34	**.40*****	.45
	Fear-related emotions	.28	.02	.37	**.43*****	.48
	Sympathy-related emotions	.22	.03	.25	**.32*****	.38
	Joy-related emotions	-.23	.03	-.38	**-.32*****	-.26

[a] *N* = 679. Estimated with AMOS 22.0.0. CI = 90% bias corrected confidence interval (bootstrap sample = 20,000). *B* = unstandardized regression coefficient, SE = standard error, LL = Lower level, *β* = standardized regression coefficient, UL = Upper level. [b] Equal distribution of negative outcomes is coded as 0 and unequal distribution of negative outcomes as 1. *p < .10, **p < .05, ***p < .01.

The mediation effects of an unequal distribution on the emotions via perceived distributive unfairness were all significant, and in the expected direction (see Table A8). However, the mediation effects of an unequal distribution on all emotions via perceived total amount of harm were not significant.

Table A8
Indirect, direct and total standardized effects of unequal distribution of negative outcomes on the emotion factors in the sample of 679 respondents[a].

	Indirect effects via						Direct effects			Total effects		
	Perceived distributive unfairness			Perceived total amount of harm								
Dependent variables:	LL	*ab*	UL	LL	*ab*	UL	LL	*β*	UL	LL	*β*	UL
Anger-related emotions	.09	**.11**	.14	-.04	**-.01**	.01	-.14	**-.07****	-.01	-.05	.03	.10
Fear-related emotions	.08	**.11**	.13	-.04	**-.01**	.01	-.14	**-.08****	-.01	-.06	.02	.09
Sympathy-related emotions	.10	**.14**	.17	-.03	**-.01**	.01	-.07	.00	.07	.05	**.13****	.20
Joy-related emotions	-.17	**-.14**	-.11	-.01	**.01**	.03	.04	**.11****	.18	-.10	-.02	.05

[a] *N* = 679.Standardized effects are presented; samples = 20.000. *ab* is the size of the standardized effect via the mediating variable. LL = lower level of the confidence interval. UL is the upper level. The confidence intervals for the indirect effects estimated with Monte Carlo simulation are 90%. The confidence intervals for the direct and total effects estimated in AMOS are 95%. *p < .10, **p < .05, ***p < .01 (only available for the direct and total effects).

In the multi-group model, the findings showed no significant differences in the direct or indirect effects between the self-relevant and not self-relevant condition. See Tables A9 and A10 for the effect sizes.

Table A9
Maximum likelihood estimates of the hypothesized direct effects in the not self-relevant and self-relevant groups separately[a].

Independent variable	Dependent variable	Not self-relevant *n* = 327			Self-relevant *n* = 352		
		LL	*β*	UL	LL	*β*	UL
Unequal distribution[b]	Perceived distributive unfairness	.28	**.38*****	.47	.24	**.34*****	.43
	Perceived total amount of harm	-.12	-.01	.10	-.16	-.05	.06
Perceived distributive unfairness	Anger-related emotions	.19	**.30*****	.40	.24	**.32*****	.41
	Fear-related emotions	.19	**.30*****	.41	.18	**.28*****	.39
	Sympathy-related emotions	.23	**.35*****	.46	.29	**.40*****	.50
	Joy-related emotions	-.56	**-.45*****	-.34	-.43	**-.33*****	-.22
Perceived total amount of harm	Anger-related emotions	.33	**.42*****	.51	.30	**.38*****	.46
	Fear-related emotions	.39	**.48*****	.57	.27	**.37*****	.46
	Sympathy-related emotions	.21	**.32*****	.43	.21	**.31*****	.40
	Joy-related emotions	-.44	**-.34*****	-.24	-.40	**-.30*****	-.19

[a] Estimated with AMOS 22.0.0. CI = 90% bias corrected confidence interval. Bootstrap samples = 20,000. LL = Lower level, *β* = standardized regression coefficient, UL = Upper level. [b] Equal distribution of negative outcomes is coded as 0 and unequal distribution of negative outcomes as 1. *p < .10, **p < .05, ***p < .01.

Table A10
Indirect, direct and total standardized effects of an unequal distribution of negative outcomes on the emotions in the not self-relevant and the self-relevant groups separately[a].

	Indirect effects via						Direct effects			Total effects		
	Perceived distributive unfairness			Perceived total amount of harm								
Dependent variables:	LL	*ab*	UL	LL	*ab*	UL	LL	*β*	UL	LL	*β*	UL
Not self-relevant (n = 327):												
Anger-related emotions	.08	**.12**	.16	-.04	-.01	.03	-.13	-.04	.06	-.04	.07	.17
Fear-related emotions	.07	**.11**	.16	-.05	-.01	.04	-.16	-.07	.03	-.07	.04	.15
Sympathy-related emotions	.09	**.13**	.18	-.03	-.00	.03	-.09	.02	.12	.04	**.15****	.25
Joy-related emotions	-.22	**-.17**	-.12	-.03	.00	.04	.01	**.09****	.18	-.16	-.05	.06
Self-relevant (n = 352):												
Anger-related emotions	.08	**.11**	.15	-.05	-.02	.01	-.20	**-.11****	-.02	-.13	-.02	.08
Fear-related emotions	.06	**.10**	.13	-.02	-.02	.01	-.19	-.10*	.00	-.12	-.02	.09
Sympathy-related emotions	.09	**.13**	.18	-.04	-.02	.01	-.12	-.03	.07	-.02	.09*	.20
Joy-related emotions	-.15	**-.11**	-.07	-.01	.02	.04	.04	**.13****	.22	-.09	.01	.11

[a] Standardized effects are presented. *ab* is the indirect effect via the mediating variable. The confidence intervals for the indirect effects estimated with Monte Carlo simulation are 90%. The confidence intervals for the direct and total effects estimated in AMOS are 95%. Bootstrap samples = 20.000. LL = Lower level. UL = Upper level. %. *p < .10, **p < .05, ***p < .01 (only available for the direct and total effects).

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